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# The Australian Lynx Spiders (Araneae, Oxyopidae, *Oxyopes*) of the Godeffroy Collection, including the description of a new species

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## Abstract

The historical Godeffroy Collection of spiders at the Centrum für Naturkunde (CeNak) in Hamburg comprises several hundred type specimens from Australia and is an essential source for arachnologists around the world. In this paper, we re-describe and illustrate the Australian *Oxyopes* material from this collection. Most specimens were collected by C. F. Eduard Dämel for the Godeffroy Museum and described in 1871-1881 by pioneering arachnologist Ludwig Carl Christian Koch as part of the first monograph on Australian spiders: *Die Arachniden Australiens*. Twelve species are redescribed and properly illustrated for the first time: *Oxyopes amoenus* L. Koch, 1878, *Oxyopes attenuatus* L. Koch, 1878, *Oxyopes elegans* L. Koch, 1878, *Oxyopes gratus* L. Koch, 1878, *Oxyopes gracilipes* (White, 1849), *Oxyopes macilentus* L. Koch, 1878, *Oxyopes molarius* L. Koch, 1878, *Oxyopes mundulus* L. Koch, 1878, *Oxyopes punctatus* L. Koch, 1878, *Oxyopes quadrifasciatus* L. Koch, 1878, *Oxyopes rubicundus* L. Koch, 1878, and *Oxyopes variabilis* L. Koch, 1878. *Oxyopes lautus* L. Koch, 1878 is treated as a numen dubium because both palps are lost. The new species *Oxyopes godeffroyi* **sp. n.** is described from this historical material and was probably overlooked by Koch. An identification key for these species is provided and the history of these specimens reviewed briefly. A map shows the localities of the redescribed *Oxyopes* species and the general distribution of the *Oxyopes* species in Queensland.

## Introduction

Historical specimen collections play a vital role in understanding patterns of biodiversity and evolution but also provide base-line data against which modern observations can be compared. Taxonomic collections also provide the reference and context for future species descriptions, in particular if they are rich in type specimens. The Godeffroy Collection of arachnids at the Centrum für Naturkunde (CeNak) is such an important historical source and comprises several hundred type specimens of arachnids from all over the world, including more than 450 types from Australia (Weidner 1959). Compiled on behalf of Johann Cesar VI Godeffroy for his private Museum Godeffroy in Hamburg from 1861 to 1885, this is arguably the oldest major collection of arachnids from Australia and still one of the primary taxonomic resources for their study in this region. Though important, taxonomists working with this collection are faced with the usual problems of old collections, such as lacking important primary data due to imprecise labelling or lost records, the necessity to re-interpret locality data, secondary information, and unclear type status of specimens. Sometimes, this may hamper taxonomic progress and one prime example is that of Lynx Spiders (family Oxyopidae) in Australia. Lynx Spiders are active daytime hunters that do not spin webs and common in all vegetated terrestrial habitats throughout the continent (Fig. 1; Framenau et al. 2014). These spiders are difficult to identify (Townsend, Felgenhauer, Grimshaw 2001) because the original descriptions for most species, based on the original material from the Museum Godeffroy, are now out-dated and the original specimens have long been difficult to access.

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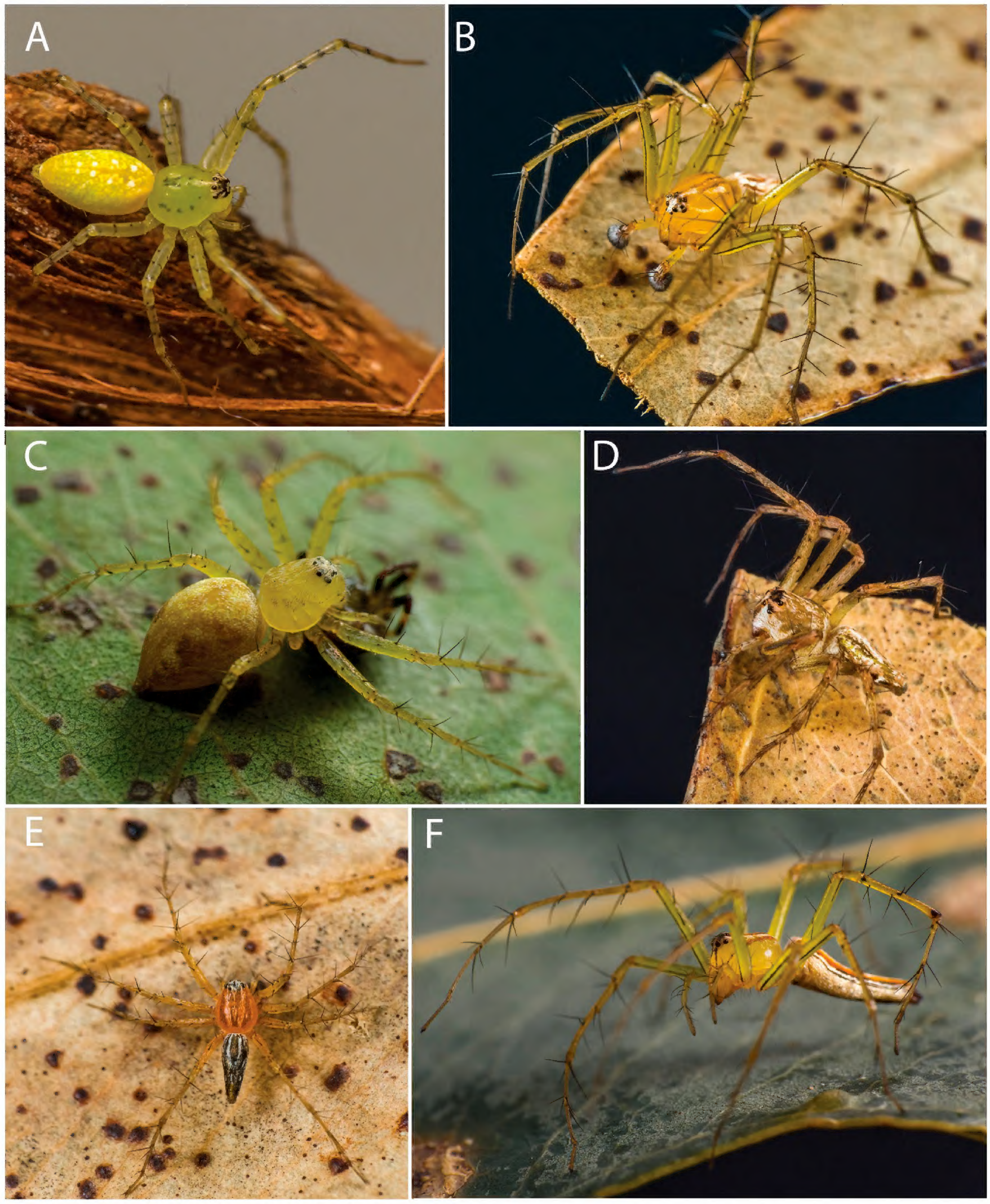


**Figure 1.** Live images of *Oxyopes* species from Australia: **A**, *Oxyopes punctatus* L. Koch, 1878; **B**, *Oxyopes* sp. indet.; **C**, *Oxyopes* sp. indet.; **D**, *Oxyopes* sp. indet.; **E**, *Oxyopes* sp. indet.; and **F**, *Oxyopes macilentus* L. Koch, 1878. Images: Robert Whyte.

Here, we redescribe, illustrate and designate Lectotypes, where necessary, for the oxyopid species that were collected for the Godeffroy Collection more than 140 years ago in Australia. There is no taxonomic revision for oxyopids in Australia and the published record of Australian Oxyopidae lists 14 species of *Oxyopes* and four additional species in the genera *Hamataliwa*, *Peucetia* and *Pseudohostus* (ALA 2017; Grimshaw 1989) although up to 60 species may occur (Framenau et al. 2014; Whyte and Anderson 2017). Holotypes of 13 *Oxyopes* species are deposited at the CeNak in Hamburg and are part of the Godeffroy spider Collection that was described by pioneering arachnologist Ludwig Carl Christian Koch as part of the first monograph on Australian spiders: *Die Arachniden Australiens*. By redescribing and documenting these types, we set the foundation for a comprehensive revision of the Australian fauna of Lynx Spiders that remains virtually unknown but is unique and highly diverse.

## Brief history of the collection

The Godeffroys were a family of wealthy shipping magnates who at the peak of their wealth entertained more than 50 commercial settlements and agencies in the Southern Seas. It was Johan Cesar VI. Godeffroy who quickly rose to fame as the Südseekönig (South Sea King) by strengthening trade in the Pacific with the support of shareholders and bankers in Hamburg. Johan Cesar VI. Godeffroy had a keen interest in natural sciences and acquired a personal collection of cultural and natural objects from all places visited by the Godeffroy ships. The collection grew steadily in size and the private Museum Godeffroy was founded in 1861 to accommodate the ever-growing collections (Scheps 2005). Godeffroy also employed professional collectors to acquire new material and the museum released its own journal and regular sales catalogues to sell duplicates (Fig. 2). These catalogues list the objects for sale with the price and a number. They also contain additional information such as zoological and geographical information, but also data supplied by the original collector and the name of the taxonomic expert who identified and described the material that was sent to him by the museum staff.

Most of the Australian natural and cultural objects were collected by Amalie Dietrich who was contracted by the Godeffroy Museum and arrived in Brisbane in 1863. Dietrich travelled widely in Queensland and collected in Brisbane, Gladstone, Rockhampton, Bowen and Mackay before she returned to Hamburg in 1872. Many of the spiders in the Godeffroy Collection are her legacy. Perhaps not as well-known is Eduard Dämel (often spelled DAEMEL) who was sent to Australia by Godeffroy after Amalie Dietrich departed to Tonga. Dämel was a renowned entomologist and had undertaken three trips to Australia and Fiji between 1863 and 1867 to collect insects which he sold as part of this private enterprise. Earning widespread recognition as a collector, he was initially employed as an assistant at the Museum Godeffroy but collected again for Godeffroy in New South Wales near Sydney (November 1871–March 1872), near Rockhampton in Queensland (March–June 1872) and at Peak Downs (June 1872–April 1873) (Weidner, 1967). Dämel was also a prolific collector of spiders and sent specimens with notes on collecting localities, biology and web structure to Hamburg. The then-curator of the museum J.D.E. Schmeltz, a friend of Dämel, forwarded these specimens to arachnologist Ludwig Koch in Nürnberg who described the spiders for his monumental work "*Die Arachniden Australiens*" and returned them to the Museum Godeffroy thereafter. Interestingly, almost all Lynx Spiders were collected by Dämel and not Dietrich, which is evident from the original labels by Koch and his descriptions. Koch also refers extensively to the notes by Dämel and most of the locality data fit one of the three collecting trips. The species were described in the 1878 section of Koch's monograph which was published between 1871 and 1881.

The Museum Godeffroy was a private enterprise and many objects were offered for commercial sale in nine catalogues published between 1864 and 1884 (Fig. 2), usually duplicates but sometimes also valuable specimens or those that were not considered to be of general interest. The oxyopids are not an exception to this rule; for example, seven species were offered for sale in the 9th catalogue for 50 pennies each (Fig. 2) whilst birds and mammals were valued much higher (a New Guinea Pademelon, a mammal, was offered in the same catalogue for 24 Mark). The Godeffroy Museum was closed officially in 1885 due to economic difficulties and the collections were sold. Several arachnids from the Godeffroy Collections are preserved in European (e.g., Berlin, London, Vienna) and non-European museums (e.g. Melbourne, Australia) because they were sold as part of the general specimen trade before or during the Museum's closure but the remaining zoological collections were purchased by the Hamburg city parliament in 1886 and integrated into the collections of the Hamburger Natural History Museum. The Godeffroy arachnid collection survived the disastrous destruction of the Hamburg Museum during World War II with minimal losses and most types, including all species of Lynx Spiders originally described by L. Koch, remain at the Zoological Museum in Hamburg.

## Material and methods

All specimens are stored in 75% EtOH but were collected into an unknown preservative and originally stored in 'Spiritus' (spirit) for commercial sale. Most specimens are bleached and have lost the original colour patterns that are characteristic of many species (Fig. 1) but notes on the colouration of live specimens were sourced from the original descriptions by L. Koch that often include collection notes by Dämel. Additional notes on the history of these specimens were compiled from the original Godeffroy catalogues and the original labels by L. Koch were photographed and are given for each species.

All specimens were examined using a Leica M 205 A microscope with attached imaging system Leica DMC 4500. The software AutoMontage Pro Version 5.2 was used for imaging and plates were assembled using Adobe Photoshop Version 13.0.6. Epigynes were placed for a few hours in a Pancreatin solution as described in Álvarez-Padilla and Hormiga (2007). After the enzymatic digestion, the epigynes were transferred to distilled water and then to 70% ethanol. All measurements are in millimetres and scale bars for the habitus images are 1.0 mm, for epigynes and palp 0.1 mm. Abbreviations are as follows: ALE anterior lateral eye; ALE–ALE distance between ALE and ALE; ALE–AME distance between ALE and AME; ALE–PLE distance between ALE and PLE; AME anterior median eye; AME–AME distance between AME and

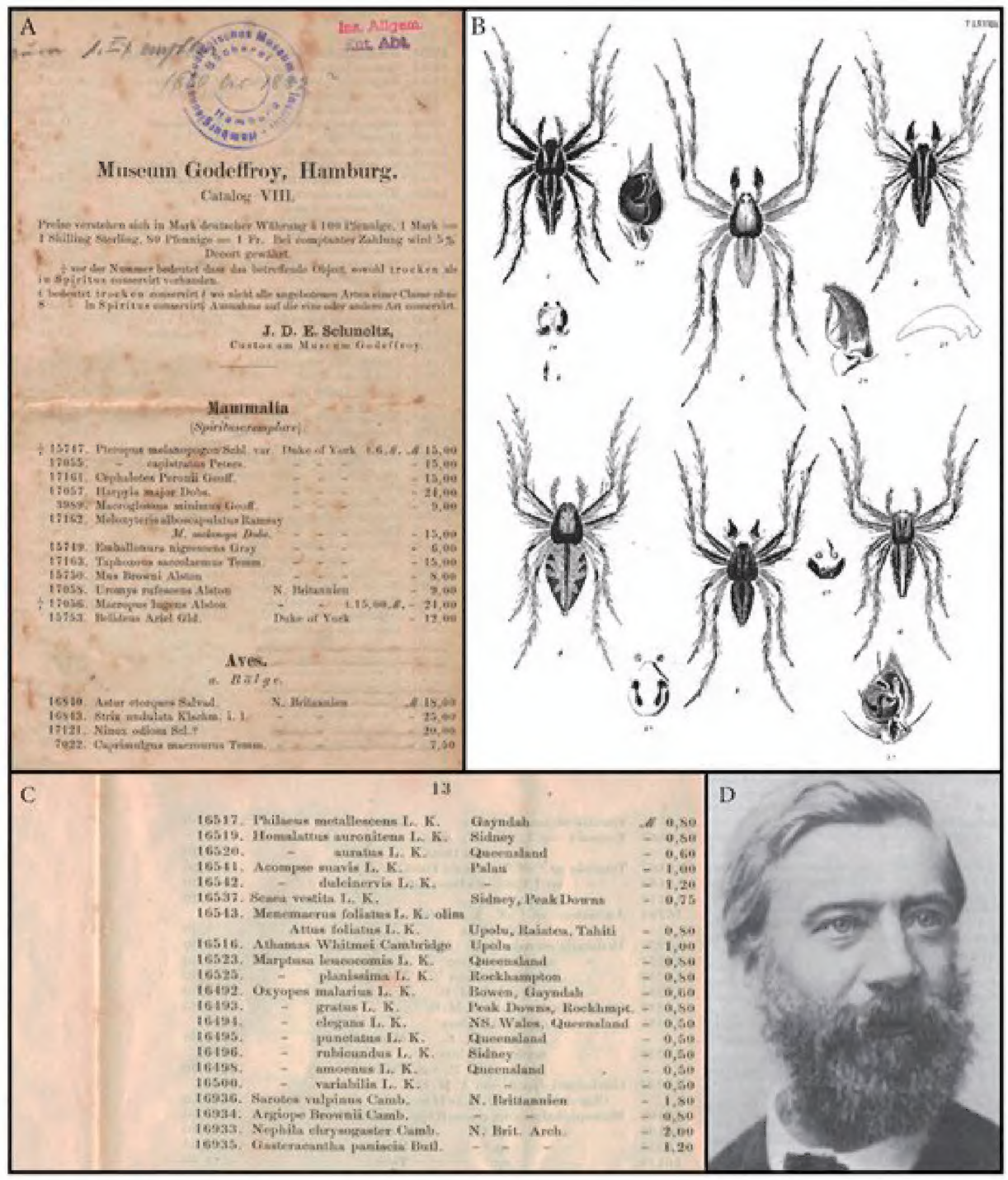


**Figure 2.** Historic images: **A,** Front page of the Godeffroy sales catalogue No. 9; **B,** Original illustrations for oxyopids taken from L. Koch's monumental work "Die Arachniden Australiens", **C,** Detailed view of the sales catalogue that offers oxyopid spiders for sale (left column = Godeffroy registration numbers, right column = price per specimen); **D,** Eduart Dämel, the main collector of the historic material.

AME; c conductor; cd copulatory duct; dta distal tegular apophysis; e embolus; fd fertilization duct; hp hooked retrobasal cymbial process; mta median tegular apophysis; pl/pw prosoma length/ prosoma width; PLE posterior lateral eye; PLE–PME distance between PLE and PME; PME posterior median eye; PME–PME distance between PME and PME; s spermathecae; sl/sw sternum length/ sternum width; vta ventral tibial apophysis.

As the original locality data are imprecise by current standards, Google Earth was used to add geographic coordinates that are rounded to the minute. The Atlas of Living Australia (ALA) was checked for additional records of the species but we stress that these records must be seen as tentative in the absence of a revisionary framework for oxyopids in Australia. Note that the Australian fauna of Oxyopidae was revised by Grimshaw (1991), but taxonomic decisions of this work are nomenclaturally invalid as the results remain unpublished. All specimens are stored at the ZMH (Zoologische Sammlung Museum Hamburg).

## Systematics

### Family Oxyopidae Thorell, 1870

### *Oxyopes* Latreille, 1804

### Key to the Australian species of the genus *Oxyopes*

1 Males (unknown for *O. attenuatus*, *O. elegans*, *O. godeffroyi*, *O. gratus*, *O. macilentus*, *O. molarius*, *O. mundulus*, *O. quadrifasciatus*, *O. rubicundus*, *O. variabilis*) ..... 2

– Females ..... 4

2 Cymbium with short hooked, retrobasal process (Figs 8D, E, 19C, D) ..... *O. gracilipes*
– Cymbium with long hooked, retrobasal process (Figs 3D, E, 13D, E, 19A, B, E, F) ..... 3
3 Median tegular apophysis rectangular with distal protuberance (Figs 3D, 19A) ..... *O. amoenus*
– Median tegular apophysis triangular (Figs 13D, 19E) ..... *O. punctatus*
4 Epigyne without scapus, sclerotized median part inverted v-shaped with large apical copulatory openings (Fig. 10C, D) *O. macilentus*
– Epigyne with scapus (Fig. e.g. 4C, D) ..... 5
5 Epigynal scapus inverted u-shaped (Fig. 5C–E) ..... *O. attenuatus*
– Scapus different ..... 6
6 Scapus inverted anchor-shaped with triangular tip (Fig. 16C–E) ..... *O. quadrifasciatus*
– Scapus different ..... 7
7 Scapus wider than long, anterior part medially indented, with anterior-lateral hooks (Figs 14C, D, 15A–C) .. *O. punctatus*
– Scapus different ..... 8
8 Scapus translucent, quadrangular (Figs 6C, D, 7C, D, 12C, D, 17C, D) ..... 9
– Scapus T-shaped (Figs 4C, D, 9C, D, 11C, D, 18C, D) ..... 12
9 Copulatory ducts (cd) with four thin coils (Figs 17D, E, 21E) ..... *O. rubicundus*
– Cd with less than 4 coils (Figs 6E, 7E, 12E) ..... 10
10 Cd with 2 coils (Figs 7E, 20D) ..... *O. godeffroyi*
– Cd with 3 coils (Figs 6E, 12E) ..... 11
11. Scapus, anterior corners less sclerotized straight (Fig. 6 C, D) ..... *O. elegans*
– Scapus, anterior corners strongly sclerotized downwards curved (Fig. 12C) ..... *O. mundulus*
12 T arms shorter than lateral lobes (Figs 9C, D, 18C, D) ..... 13
– T arms longer than lateral lobes (Figs 4C, D, 11C, D) ..... 14
13 Cd short, with 2 broad coils (Figs 9E, 20F) ..... *O. gratus*
– Cd thin, convoluted with 7 thin coils (Figs 18E, 21F) ..... *O. variabilis*
14 Cd with 3 coils reaching far beyond arms of scapus (Figs 4E, 20A) ..... *O. amoenus*
– Cd with 4 coils reaching just beyond arms of scapus (Figs 11E, 21B) ..... *O. molarius*

## Re-description of the species

### *Oxyopes amoenus* L. Koch, 1878

Figs 3A–E, 4A–E, 19A, B, 20A

569. *Oxyopes amoenus* L. Koch, 1878, 1017-1020, Taf. 89, Fig. 4 + 4 a u. 5 + 5 a, Australien, Rockhampton, Gayndah, 3 Syntypen (Mus. GODEFFROY Nr. 16498) (37) (Rack 1961).

**Material examined. Designated here: MALE LECTOTYPE** (ZMH-A0000029), from **Queensland**, Rockhampton, 23°22'S, 150°30'E, Godeffroy Collection. (ZMH-A0000003) 1 female paralectotype, same as lectotype; (ZMH-A0000004) 1 male paralectotype, Sydney, 33°51'S, 151°12'E, Godeffroy Collection.

**Diagnosis.** Males of *Oxyopes amoenus* are similar to those of *Oxyopes punctatus* in having a long retrobasal, hooked cymbial process but can be distinguished by the different shape of the tegular apophysis (Figs 3D, 19A). Females of *Oxyopes amoenus* are similar to *Oxyopes molarius* but can be separated by the shorter straighter lateral lobes and the 3 coils, which are clearly visible apically of the T-shaped scapus (Figs 4C–E, 20A).

**Description.** *Male* (Lectotype, ZMH-A0000029). Total length 5.85. Prosoma 2.72 long, 2.15 wide, pl/pw 1.26; sternum 1.10 long, 0.98 wide, sl/sw 1.12; opisthosoma 3.13 long, 1.64 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.11; ALE 0.21; PLE 0.18; PME 0.18; ALE–ALE 0.20; ALE–AME 0.07; AME–AME 0.14; ALE–PLE 0.19; PLE–PME 0.25; PME–PME 0.27. Clypeus 0.46 high with a pair of longitudinal broad brown bands. Prosoma pale with broad brown bands laterally and one triangular medially, broadly oval, posteriorly rounded; fovea short, 0.13 of prosoma length. Chelicerae paturon pale with longitudinal broad median dark band and lateral condyle. Endites and sternum pale, labium and lateral part of sternum dark brown; opisthosoma pale with dark brown markings laterally and a median band becoming a series of triangles posteriorly; venter pale with two longitudinal dark brown stripes laterally and a dark brown band medially. Legs pale, scattered with dark brown markings. Body covered with thick pale setae. Male palp (Figs 3C–E, 19A, B): cymbium broadly oval, with long retrobasal, hooked process, covered with pale setae and 1 prolateral spine in distal third; median tegular apophysis nearly rectangular with distal protuberance in prolatero-distal position, conductor membranous, broad, with hook-like distal part, originating retro-distally; sperm duct u-shaped; embolus semicircular covered partly by mta, with sharp retro-distal tip fitting in down-curved distal tegular apophysis and apex of conductor; tibia with 3 long strong setae and rectangular, ventral tibial apophysis. *Female* (paralectotype, ZMH–A0000003). Total length 8.14. Prosoma 3.11 long, 2.27 wide, pl/pw 1.37; sternum 1.22 long, 1.06 wide, sl/sw 1.15; opisthosoma 5.03 long, 3.33 wide. Colour as in male. Opisthosoma pear-shaped;

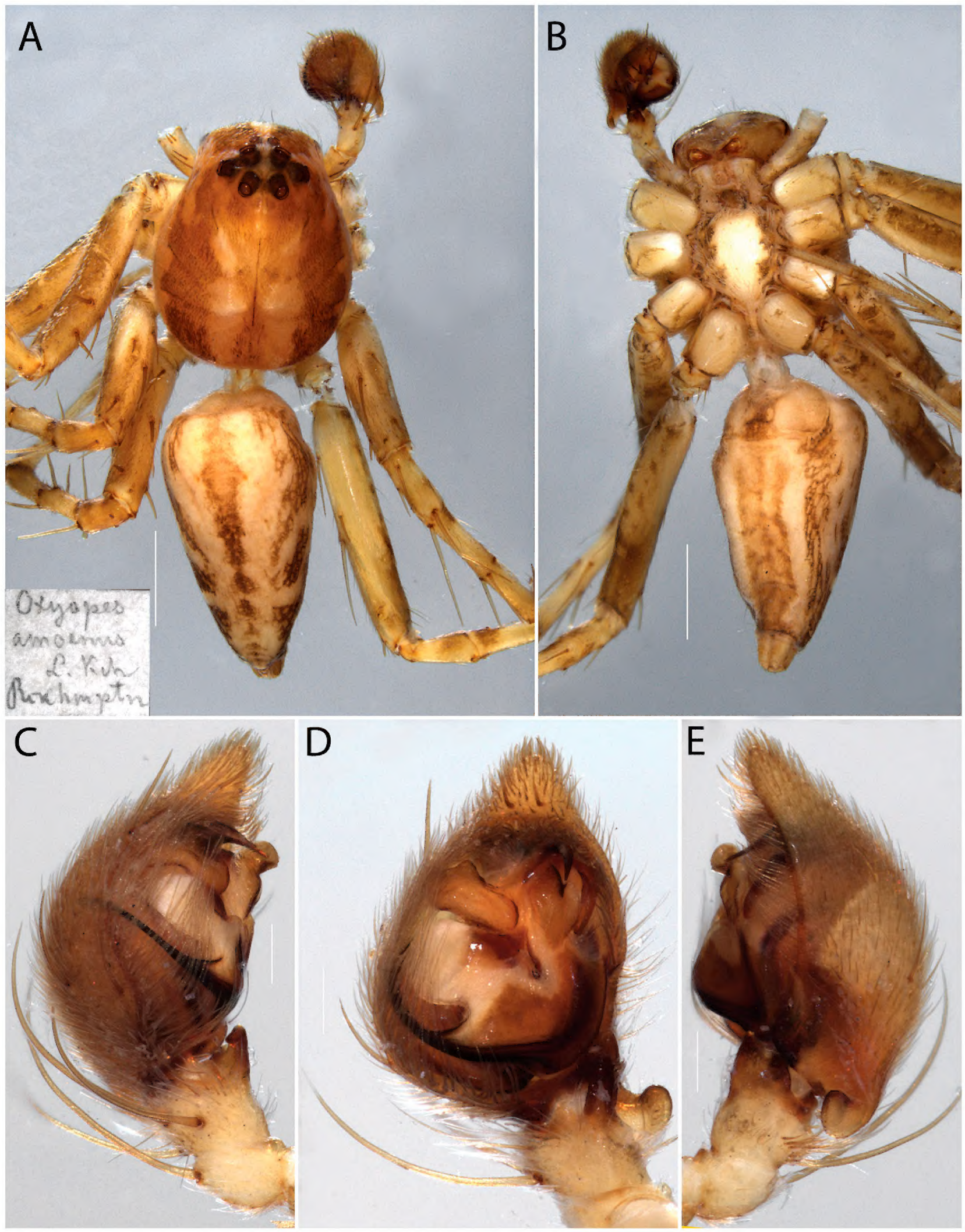


**Figure 3.** *Oxyopes amoenus* L. Koch, 1878, male lectotype (ZMH- A0000029): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C,** male palp, prolateral view; **D**, same, ventral view; **E**, same, retrolateral view. Scale bars: habitus 1.0 mm, palp 0.1 mm.

Eyes AME 0.08; ALE 0.19; PLE 0.19; PME 0.19; ALE–ALE 0.25; ALE–AME 0.09; AME–AME 0.12; ALE–PLE 0.19; PLE–PME 0.25; PME–PME 0.32. Clypeus 0.76 high. Female epigyne (Figs 4C–E, 20A): with broad T-shaped scapus and long lateral lobes, reaching at least the middle of scapus; T arms reaching beyond lateral lobes; copulatory openings in the middle of lateral lobes, copulatory ducts, thin, convoluted with 3 thick coils, ending in egg-shaped lateral spermathecae.

**Distribution.** Known originally from Rockhampton in northern Queensland and Sydney in New South Wales. The ALA lists many additional records from central, eastern and Western Australia that need to be checked as part of a taxonomic revision of the Australian oxyopid fauna.

**Remarks.** Koch mentioned that Dämel found the specimens he collected on leaf litter. It is likely that all specimens at ZMH were collected by Dämel.

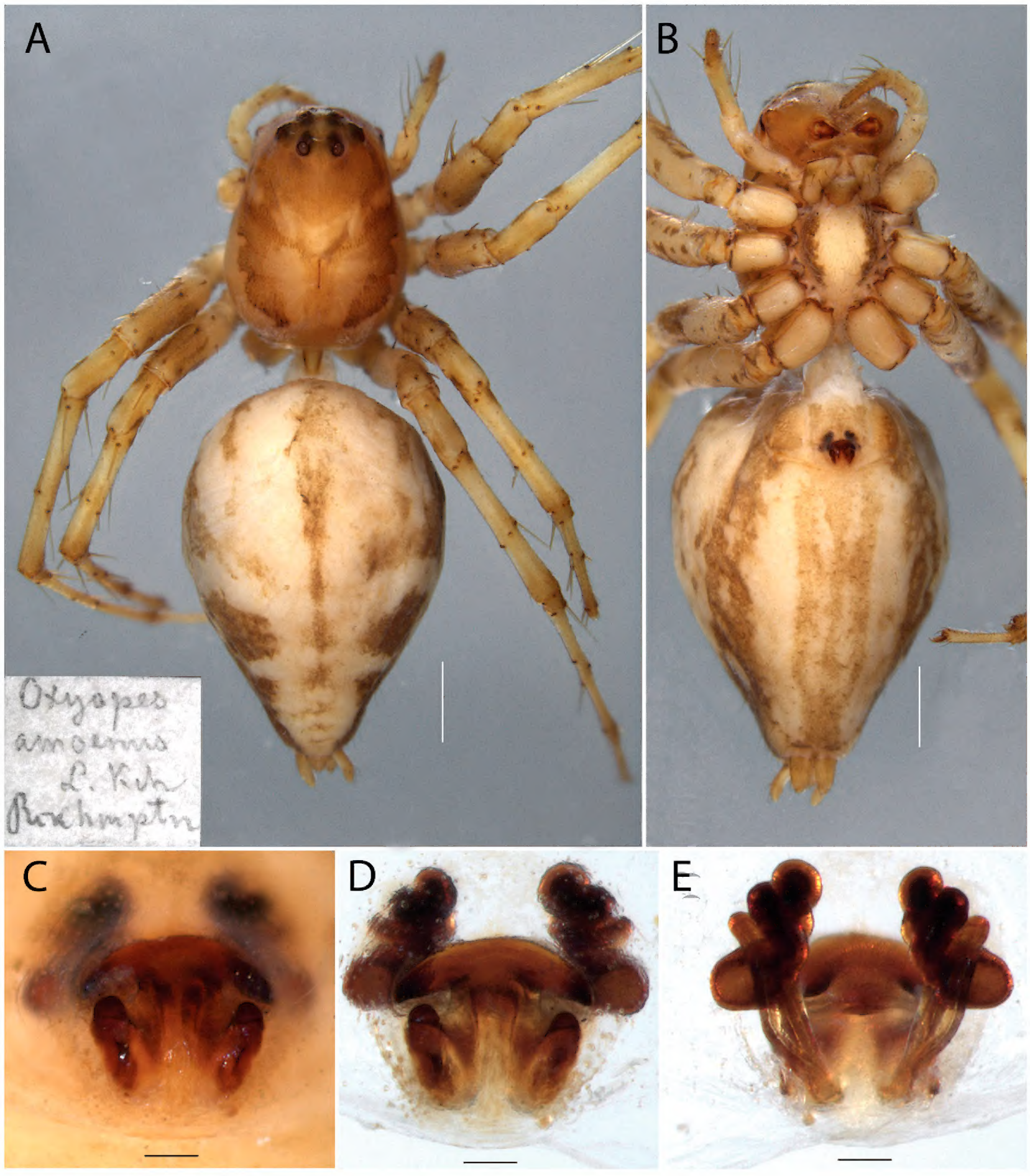


**Figure 4.** *Oxyopes amoenus* L. Koch, 1878, female syntype (ZMH- A0000003): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

### *Oxyopes attenuatus* L. Koch, 1878

Figs 5A–E, 20B

570. *Oxyopes attenuatus* L. KOCH 1878, 1002-1003, Taf. 88 Fig. 6 + 6 a, Australien, Peak Downs, female Holotype (Mus. GODEFFROY Nr. 16491) (37) (Rack 1961).

**Material examined.** FEMALE HOLOTYPE (ZMH-A0000005), from **Queensland**, Peak Downs, "now large open cut coking coal mine in Queensland located 31 km SSE of Moranbah", 22°15'9.60"S, 148°10'30.00"E, Godeffroy Collection.

**Diagnosis.** The female of *Oxyopes attenuatus* can be separated from females of all other described Australian *Oxyopes* species by the inverted u-shaped scapus, the long and straight copulatory ducts, and the globular apical spermathecae (Figs 5D,E, 20B). Male unknown.

**Description.** *Female* (Holotype, ZMH-A0000005). Total length 6.67. Prosoma 2.57 long, 1.72 wide, pl/pw 1.49; sternum 1.07 long, 0.86 wide, sl/sw 1.24; opisthosoma 4.1 long, 1.44 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.09; ALE 0.19; PLE 0.14; PME 0.14; ALE–ALE 0.41; ALE–AME 0.19; AME–AME 0.16; ALE–PLE 0.20; PLE-PME 0.23; PME–PME 0.25. Clypeus 0.45

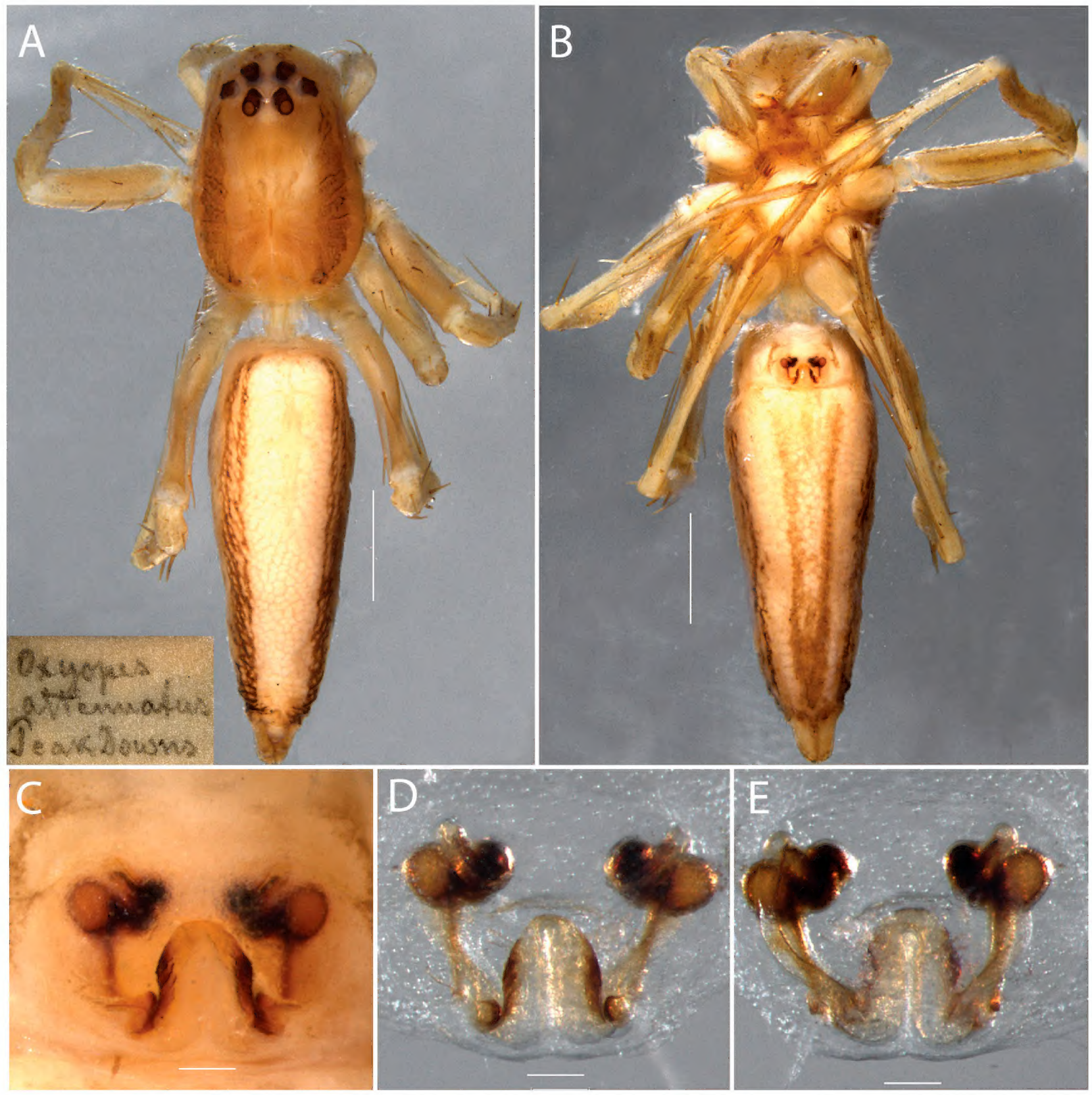


**Figure 5.** *Oxyopes attenuatus* L. KOCH 1878, female holotype (ZMH- A0000005): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

high with a pair of thin brown longitudinal stripes. Prosoma pale with brown lateral bands, rectangular, posteriorly straight, fovea short. Chelicerae paturon pale with median dark longitudinal stripe and lateral condyle. Endites, labium and sternum pale; opisthosoma pale with two longitudinal dark brown bands; venter pale with two longitudinal dark brown stripes laterally. Legs pale ventrally with dark brown longitudinal stripes. Female epigyne (Fig. 5C–E): with inverted u-shape scapus and short lateral lobes, copulatory openings anteriorly of lateral lobes, copulatory ducts, thin, long and straight, ending in globular apical spermathecae (Figs 5C–E, 20B).

**Distribution.** Known originally from Peak Downs in central Queensland. The ALA lists additional records from near Brisbane and Karumba in northern Queensland.

**Remarks.** Koch mentions that the holotype was collected by Dämel (Koch 1877). Nothing is known about the life coloration and specific habitats for this species.

### *Oxyopes elegans* L. Koch, 1878

Figs 6A–E, 20C

572. *Oxyopes elegans* L. Koch, 1878, 1008-1010, Taf. 88 Fig. 5 + 5 a u. 6-6 b, Australien, Sydney, Rockhampton, Peak Downs, 6 Syntypen (Mus. GODEFFROY Nr. 16494) (37) (Rack 1961).

**Material examined. Designated here: FEMALE LECTOTYPE** (ZMH-A0000006), from **New South Wales**, Sydney, 33°51'S, 151°12'E, Godeffroy Collection; (ZMH-A0000048) 2 paralectotypes females, same as lectotype, Godeffroy Collection.

**Diagnosis.** Females of *Oxyopes elegans* are similar to *Oxyopes godeffroyi, Oxyopes mundulus* and *Oxyopes rubicundus* in having a translucent, quadrangular scapus. They can be separated from *Oxyopes mundulus* by the scapus anterior corners less sclerotized and straight, and

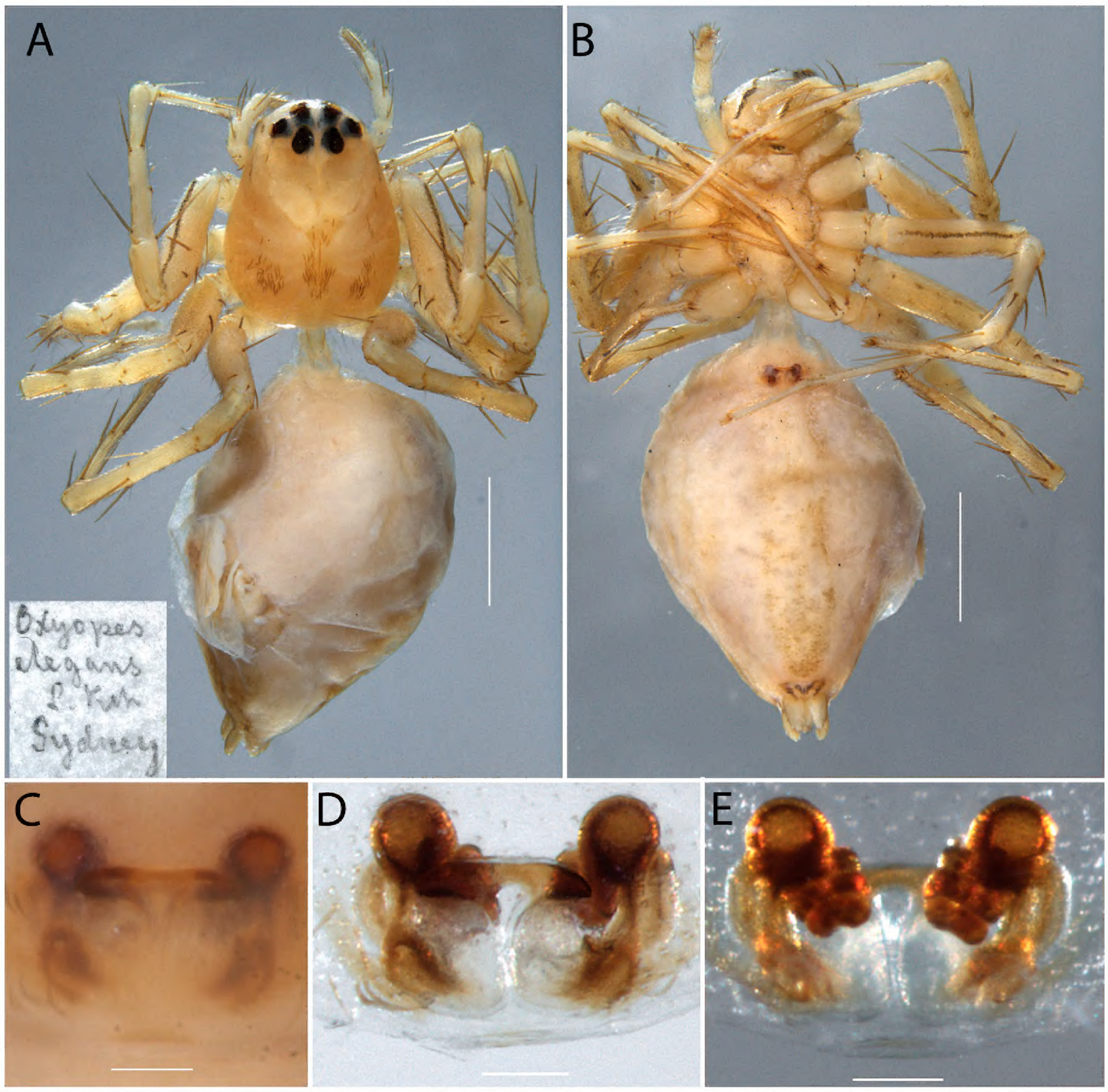


**Figure 6.** *Oxyopes elegans* L. Koch, 1878, female lectotype (ZMH- A0000006): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

from *Oxyopes godeffroyi* and *Oxyopes rubicundus* in having copulatory ducts with 3 coils (Figs 6E, 20C). Male unknown.

**Description.** *Female* (Lectotype, ZMH-A0000006). Total length 4.97. Prosoma 1.88 long, 1.47 wide, pl/pw 1.28; sternum 0.83 long, 0.73 wide, sl/sw 1.14; opisthosoma 3.09 long, 2.30 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.08; ALE 0.16; PLE 0.13; PME 0.13; ALE–ALE 0.15; ALE–AME 0.05; AME–AME 0.11; ALE–PLE 0.16; PLE–PME 0.21; PME–PME 0.23. Clypeus 0.34 high with a pair of longitudinal thin dark brown stripes. The specimen is strongly bleached. Prosoma pale, covered with brown scales, broadly rectangular, posteriorly straight, fovea short 0.17 of prosoma length. Chelicerae paturon pale with longitudinal thin median dark stripe and lateral condyle. Endites, labium and sternum pale; opisthosoma pale. Legs pale ventrally with thin dark brown stripes. Female epigyne (Fig. 6C–E): scapus translucent, quadrangular with sclerotized anterior border and adjacent lateral lobes, copulatory openings at the anterior part of the lateral lobes, copulatory ducts, thin, with 3 coils, ending in globular apical spermathecae situated fully anteriorly of sclerotized anterior border (Figs 6C–E, 20C).

**Distribution.** Known originally from Sydney in New South Wales. The ALA lists many additional records from southwestern Australia, the Northern Territory, coastal Queensland and Victoria that should be reviewed.

**Remarks.** Koch mentions that the species seems to prefer swampy areas. This information was probably derived from Dämel's travel reports. No notes on life colouration are given in the original description.

### *Oxyopes godeffroyi* sp. n.

http://zoobank.org/5E901755-DBA6-45FE-9AE6-187B1DEB5F42
Figs 7A–E, 20D

572. *Oxyopes elegans* L. Koch, 1878, 1008-1010, Taf. 88 Fig. 5 + 5 a u.
6-6 b, Australien, Sydney, Rockhampton, Peak Downs, 6 Syntypen (Mus. GODEFFROY Nr. 16494) (37) (Rack 1961). This is likely to be the undescribed species referred to in Vink and Sirvid 2000 (p. 637).

**Material examined. FEMALE HOLOTYPE** (ZMH-A0000008), from **Queensland**, Rockhampton, 23°22'S, 150°30'E, Godeffroy Collection; (ZMH-A0000049), 1 female, same data as holotype, Godeffroy Collection.

**Diagnosis.** Females of *Oxyopes godeffroyi* are similar to *Oxyopes elegans*, *Oxyopes mundulus* and *Oxyopes rubicundus* in having a translucent, quadrangular scapus but can be separated from *Oxyopes elegans*, *Oxyopes mundulus* and *Oxyopes rubicundus* by having cd with only 2 coils (Figs 7E, 20D). Male unknown.

**Description.** *Female* (Holotype, ZMH-A0000008). Total length 6.87. Prosoma 2.63 long, 1.77 wide, pl/pw 1.48; sternum 1.16 long, 0.99 wide, sl/sw 1.17; opisthosoma 4.24 long, 2.47 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.08; ALE 0.19; PLE 0.18; PME 0.18; ALE–ALE 0.23; ALE–AME 0.08; AME–AME 0.14; ALE-PLE 0.23; PLE–PME 0.26; PME–PME 0.27. Clypeus 0.63 high with a pair of dark brown bands. Prosoma pale with dark brown later-

**Figure 7.** *Oxyopes godeffroyi* sp. n., female holotype (ZMH- A0000008): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

al sides and one brown median band, long rectangular, posteriorly rounded, fovea short 0.13 of prosoma length. Chelicerae paturon pale with broad median dark band and lateral condyle. Endites and sternum pale, labium and lateral part of sternum with dark brown patches; opisthosoma long tear drop-shaped, brown with two pale median longitudinal bands dorsally and pale longitudinal streaking laterally; venter with a longitudinal median brown stripe flanked by two pale stripes. Female epigyne (Figs 7C–E, 20D): scapus translucent, quadrangular with sclerotized anterior border and adjacent lateral lobes, copulatory openings at the anterior part of the lateral lobes, copulatory ducts, short, with 2 coils, ending in egg-shaped apical spermathecae situated on the lateral sides of the sclerotized anterior border (Fig. 20D).

**Distribution.** Known only from Rockhampton in northern Queensland.

**Remarks.** This species was identified from the historic material at ZMH that was previously misidentified as *O. elegans* and stored in the same glass jar.

**Etymology.** The specific name is a patronym in honour of the Godeffroy family who founded the Godeffroy Collection of spiders which is now located at the Centrum für Naturkunde in Hamburg. This collection is essential source for current research and comprises several hundred type specimens of arachnids from all over the world, including more than 450 spider types from Australia and the Pacific Islands. It is the oldest major collection of Australian spiders and world-renowned.

### *Oxyopes gracilipes* (White, 1849)

Figs 8A–E, 19C, D

*Sphasus gracilipes* White, 1849: 5 (Df). *Oxyopes gracilipes:* Vink and Sirvid 1998: 2, f. 1-8 (f, Sm); Vink and Sirvid 2000: 637, f. 2A-B (m, S); Whitehouse and Grimshaw 2007: 98, f. 7-8, 11, 12-14, 23 (mf); Paquin, Vink and Dupérré 2010: 93, f. 57.1-5 (mf).

572. *Oxyopes elegans*: L. Koch, 1878, 1008-1010, Taf. 88 Fig. 5 + 5 a und 6-6 b, Australien, Sydney, Rockhampton, Peak Downs, 6 Syntypen (Mus. GODEFFROY Nr. 16494) (37) (Rack 1961).

(ZMH-A0000007). *Oxyopes elegans* L. Koch, 1878 male Syntype, Peak Downs = *Oxyopes gracilipes* (White, 1849). Misidentification. Part.

**Material examined.** MALE SYNTYPE (ZMH-A0000007), from **Queensland**, Peak Downs, "now large open cut coking coal mine in Queensland located 31 km SSE of Moranbah", 22°15'9.60"S, 148°10'30.00"E, Godeffroy Collection.

**Diagnosis.** Males of *Oxyopes gracilipes* differ from the other two described species with males in having a short retro-basal, hooked cymbial process (Figs 8E, 19D). Female see Vink and Sirvid (2000).

**Description.** *Male* (ZMH-A0000007). Total length 5.85. Prosoma 2.32 long, 1.79 wide, pl/pw 1.30; sternum 1.04 long, 0.99 wide, sl/sw 1.12; opisthosoma 2.43 long, 1.37 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.10; ALE 0.20; PLE 0.16; PME 0.16; ALE–ALE 0.16; ALE–AME 0.05; AME–AME 0.14; ALE–PLE 0.14; PLE–PME 0.21; PME–PME 0.22. Clypeus 0.40 high with a pair of thin brown longitudinal stripes. Prosoma pale, with broad brown bands laterally and one triangular medially, broadly oval, posteriorly rounded, fovea short 0.14 of prosoma length. Chelicerae paturon pale with thin dark longitudinal stripe and lateral condyle. Endites and sternum pale, labium and margins of sternum dark brown; opisthosoma pale bleached; venter pale with a dark brown band medially. Legs pale scattered with dark brown markings. Male palp (Figs 8C–E, 19C, D): cymbium oval, apex elongated, cymbium with short retro-basal, hooked process, covered with pale setae and 1 prolateral spine in basal third; median tegular apophysis (mta) broadly pear-shaped with retrolateral triangular tip, conductor membranous, finger-shaped, with hook-like distal part, originating retro-basally; embolus semicircular, with sharp retro-distal tip fitting in distal tegular apopysis and apex of conductor; tibia with rectangular ventral tibial apophysis.

**Distribution.** Original records from eastern Australia with specimens from New South Wales (Sydney) and Queensland (Peak Downs & Rockhampton). The ALA lists many more records from eastern Australia, South Australia and southwestern Australia that need to be verified.

**Comments.** The vials of *Oxyopes elegans* in the ZMH collection (Mus. GODEFFROY Nr. 16494) contains mixed samples of this species, *Oxyopes godeffroyi* sp. n. and *Oxyopes gracilipes*; a widespread species in Australia and New Zealand. It is possible that Koch (1878) treated all samples as one species but the re-examination of the historic material clearly shows that this collection comprised three species.

### *Oxyopes gratus* L. Koch, 1878

Figs 9A–E, 20F

573. *Oxyopes gratus* L. Koch, 1878, 1006-1008, Taf. 88 Fig. 3 + 3 a und 4-4 b, Australien, Peak Downs, 2 Syntypen (Mus. GODEFFROY Nr. 16495) (37) (Rack 1961).

**Material examined. Designated here**: **FEMALE LECTOTYPE** (ZMH-A0000009), from **Queensland**, Peak Downs, "now large open cut coking coal mine in Queensland located 31 km SSE of Moranbah", 22°15'9.60"S, 148°10'30.00"E, Godeffroy Collection; (ZMH-A0000030) 1 female paralectotype, same as lectotype, Godeffroy Collection.

**Diagnosis.** The female of *Oxyopes gratus* is similar to *Oxyopes variabilis* in having a T-shaped scapus with T arms shorter than lateral lobes but can be separated from *Oxyopes variabilis* by having copulatory ducts with only 2 coils (Figs 9E, 20F). Male unknown.

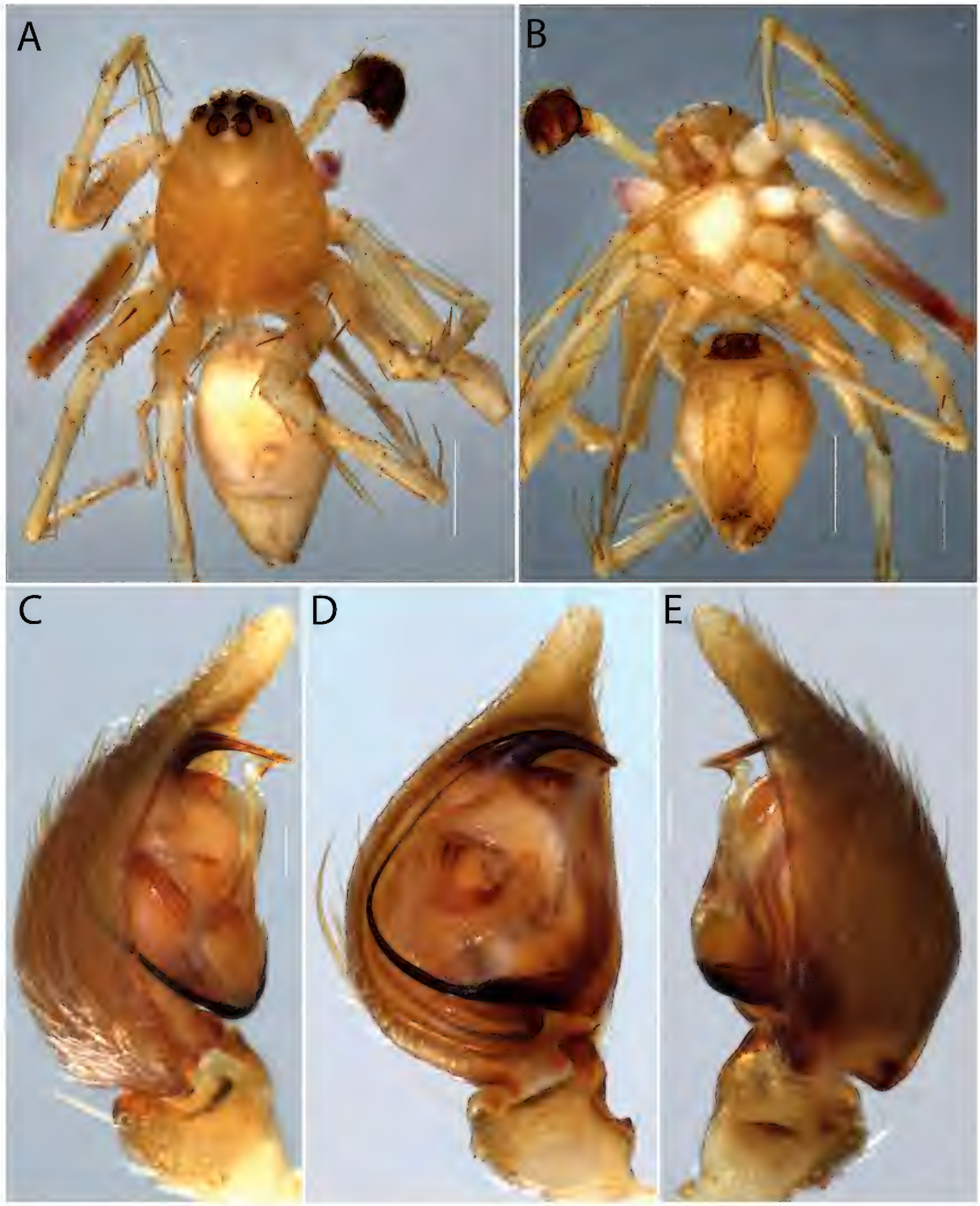


**Figure 8.** *Oxyopes gracilipes* (White, 1849), male syntype (ZMH- A0000007): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C,** male palp, prolateral view; D, same, ventral view; **E**, same, retrolateral view. Scale bars: habitus 1.0 mm, palp 0.1 mm.

**Description.** *Female* (Lectotype, ZMH- A0000009). Total length 8.27. Prosoma 2.98 long, 2.16 wide, pl/pw 1.38; sternum 1.22 long, 1.07 wide, sl/sw 1.14; opisthosoma 5.29 long, 2.25 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.09; ALE 0.25; PLE 0.21; PME 0.21; ALE–ALE 0.20; ALE–AME 0.10; AME–AME 0.20; ALE–PLE 0.22; PLE–PME 0.34; PME–PME 0.25. Clypeus 0.56 high with a pair of longitudinal dark brown bands. Prosoma pale with dark brown lateral bands, rectangular, posteriorly rounded, fovea short 0.12 of prosoma length. Chelicerae paturon pale with longitudinal median dark band and lateral condyle. Endites and sternum pale, labium and lateral part of sternum with dark brown patches; opisthosoma elongated, pale with dark brown lateral sides interrupted by pale stripes; venter pale with a long, triangular, dark brown median band. Legs pale with dark brown markings. Female epigyne (Figs 9C–E, 20F): scapus inverted anchor-shaped with broad base posteriorly, translucent with sclerotized lateral edges, adjacent lateral lobes rounded, copulatory opening at the middle part of the lateral lobes, copulatory ducts,

**Figure 9.** *Oxyopes gratus* L. Koch, 1878, female lectotype (ZMH- A0000009): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

short, with 2 broad coils, ending in globular spermathecae situated behind sclerotized edges of the scapus.

**Distribution.** Original record from Peak Downs in northern Queensland. The ALA lists additional records from Queensland, Victoria, the Northern Territory, and the Goldfields in Western Australia.

**Remarks.** Koch mentions that the specimens were collected by Dämel who observed the species on leaves.

### *Oxyopes lautus* L. Koch, 1878

L. Koch, 1878, 1015–1017, Taf. 89 Fig. 3, Australien, Port Mackay, male HOLOTYPE (Mus. GODEFFROY Nr. 16497) (37) (Rack 1961).

**Note.** Koch described the species from a single male that was in poor condition ("fast völlig abgerieben", p. 1015) and had both palps removed. Oxyopids are often variable in colour and the genitalia need to be studied in order to reliably identify species. We treat this specimen as a *nomen dubium*.

### *Oxyopes macilentus* L. Koch, 1878

Figs 10A–E, 21A

577. *Oxyopes macilentus* L. Koch, 1878, 1000-1002, Taf. 87 Fig. 4 + 4 a u. 5-5 b, Australien, Rockhampton, 3 Syntypen (Mus. GODEFFROY Nr. 6512. Two more females from an unknown locality because the original label is bleached, these are probably the syntypes (Mus. GODEFFROY Nr. 6512) (37) (Rack 1961).

**Material examined. Designated here**: **FEMALE LECTOTYPE** (ZMH-A0000012), from **Queensland**,

**Figure 10.** *Oxyopes macilentus* L. Koch, 1878, female lectotype (ZMH- A0000012): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

Rockhampton, 23°22'S, 150°30'E, Godeffroy Collection; (ZMH-A0000028) 2 female paralectotypes, same data as lectotype, Godeffroy Collection; (ZMH-A0000011) 2 females no locality.

**Diagnosis.** *Oxyopes macilentus* females can be separated from females of all other described Australian *Oxyopes* species by having no scapus, but an inverted v-shaped, sclerotized median part with large apical copulatory openings (Fig. 10C, D). Male unknown.

**Description.** *Female* (Lectotype, ZMH-A0000012). Total length 6.63. Prosoma 2.36 long, 1.76 wide, pl/pw 1.34; sternum 1.04 long, 0.97 wide, sl/sw 1.07; opisthosoma 4.27 long, 1.47 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest, ALE biggest, others equal in size; AME 0.09; ALE 0.20; PLE 0.15; PME 0.15; ALE–ALE 0.15; ALE–AME 0.03; AME-AME 0.11; ALE–PLE 0.18; PLE–PME 0.22; PME–PME 0.18. Clypeus 0.44 high with a pair of dark brown bands. Prosoma pale with two thin, longitudinal, median, brown bands and two broad, lateral, brown bands, oval, posteriorly rounded, fovea short 0.16 of prosoma length. Chelicerae paturon pale with median dark stripe and lateral condyle. Endites, labium and sternum pale; opisthosoma elongated, pale with dark brown lateral and medial stripes (in live orange); venter pale with a long, triangular, dark brown median band. Legs pale ventrally with dark brown markings. Female epigyne (Figs 10C–E, 21A): sclerotized median part inverted v-shaped with large apical copulatory openings, adjacent lateral lobes

absent, copulatory ducts, short, thick with one broad coil, ending in globular spermathecae situated apically.

**Distribution.** Original record from Rockhampton in central Queensland. The ALA lists many additional records from coastal and central Queensland, the Northern Territory and even Papua New Guinea that should be checked.

**Remarks.** Koch (1877) notes that he had several specimens from Bowen, "Cape York", Gayndah, Rockhampton and Port Mackay from the Bradley and Godeffroy Collections that were mostly collected by Dämel. He cites the collector in noting that live specimens have yellow green legs and an abdomen that is rusty red with pale yellow stripe.

### *Oxyopes molarius* L. Koch, 1878

Figs 11A–E, 21B

*Oxyopes molarius* L. Koch, 1878, 1004-1006, Taf. 88 Fig. 1 + 1 a u. 2 + 2 a, Australien, Bowen, Gayndah, 2 Syntypen (Mus. GODEFFROY Nr. 16492) (37) (Rack 1961).

**Material examined. Designated here: FEMALE LECTOTYPE** (ZMH-A0000013), from **Queensland**, Bowen, 20°00'S, 148°14'E, Godeffroy Collection; (ZMH-A0000014) 1 female paralectotype, Daemel 205, Gayndah, 25°37'S, 151°36'E, Godeffroy Collection. Male unknown.

**Diagnosis.** Females of *Oxyopes molarius* are similar to those of *Oxyopes amoenus* but can be distinguished from that by the longer lateral lobes in v-shaped position and the coils are mostly hidden behind the T-shaped scapus (Figs 11 D,E, 21 B).

**Description.** *Female* (Lectotype, ZMH- A0000013). Total length 9.09. Prosoma 3.23 long, 2.18 wide, pl/pw 1.48; sternum 1.39 long, 1.26 wide, sl/sw 1.10; opisthosoma 5.86 long, 2.75 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest, ALE biggest, others equal in size; AME 0.11; ALE 0.24; PLE 0.20; PME 0.20; ALE–ALE 0.23; ALE–AME 0.04; AME–AME 0.18; ALE–PLE 0.25; PLE–PME 0.28; PME–PME 0.30. Clypeus 0.61 high with a pair of dark brown stripes. Prosoma pale with 2 dark brown lateral bands, oval, posteriorly straight, fovea short 0.14 of prosoma length. Chelicerae paturon pale with lateral condyle. Endites, labium and sternum pale, lateral part of sternum with dark brown patches; opisthosoma elongated, pale with dark brown lateral and medial stripes; venter pale with a long, triangular, pale brown median band. Legs pale ventrally and retrolaterally with dark brown dots. Female epigyne (Figs 11C–E, 21B): scapus broad, T-shaped with long lateral lobes, reaching 3/4 of scapus; copulatory openings in the basal 1/3 of lateral lobes, copulatory ducts, thin, convoluted with 3 thin coils, ending in globular, lateral spermathecae.

**Distribution.** Original records from Gayndah in central Queensland. The ALA lists many additional records from coastal and central Queensland, South Australia and New South Wales that need to be re-checked.

**Remarks.** According to Koch, the specimens from Peak Downs were collected by Dämel who notes that live specimens have marine green legs and a grey-brownish abdomen with white stripes.

### *Oxyopes mundulus* L. Koch, 1878

Figs 12A–E, 20E

579. *Oxyopes mundulus* L. Koch, 1878, 1025-1026, Taf. 90 Fig. 3 + 3 a, Australien, Sydney, Holotype (Mus. GODEFFROY Nr. 16501) (37). (Rack 1961).
*Oxyopes mundulus* L. Koch, 1878 (Hickman 1967).

**Material examined.** FEMALE HOLOTYPE (ZMH-A0000015), from **New South Wales**, Sydney, 33°51'S, 151°12'E, Godeffroy Collection.

**Diagnosis.** Females of *Oxyopes mundulus* are similar to *Oxyopes elegans* and *Oxyopes godeffroyi, Oxyopes rubicundus* in having a translucent, quadrangular scapus. They can be separated from *Oxyopes godeffroyi* by having copulatory ducts with 3 coils (Figs 12E, 20E), and from *Oxyopes elegans and Oxyopes rubicundus* by the more heavily sclerotized and downward curved anterolateral scapus tips, from *Oxyopes gracilipes* by having the spermathecae an anterior position ( see Vink and Sirvid 1998, fig 8).

**Description.** *Female* (Holotype, ZMH-A0000015). Total length 5.17. Prosoma 2.32 long, 1.76 wide, pl/pw 1.32; sternum 1.10 long, 0.93 wide, sl/sw 1.18; opisthosoma 2.85 long, 1.78 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.09; ALE 0.21; PLE 0.20; PME 0.20; ALE–ALE 0.24; ALE–AME 0.06; AME–AME 0.14; ALE–PLE 0.22; PLE–PME 0.24; PME–PME 0.29. Clypeus 0.52 high with a pair of dark brown bands. Prosoma pale with dark brown lateral sides and one logitudinal brown median band, anteriorly forked, oval, posteriorly rounded, fovea short 0.15 of prosoma length. Chelicerae paturon pale with broad logitudinal median dark band and lateral condyle. Endites and sternum pale, labium and lateral part of sternum with dark brown; opisthosoma long pear-shaped, pale with dark brown lateral sides interrupted by pale stripes and one brown median band with pale lanceolate anterior part; venter pale with two lateral dark brown stripes and a dark brown median band. Legs pale with dark brown bands especially on the femora. Female epigyne (Figs 12C–E, 20E): scapus translucent, quadrangular with sclerotized down curved anterior edges and adjacent lateral lobes, copulatory openings at the anterior part of the lateral lobes, copulatory ducts short, with 3 coils, ending in globular apical spermathecae situated on the anterior-lateral sides of the sclerotized anterior border.

**Distribution.** Original record from Sydney, New South Wales.

**Figure 11.** *Oxyopes molarius* L. Koch, 1878, female lectotype (ZMH- A0000013): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

**Remarks.** Koch mentions that the specimen was collected in dry leaf litter.

**Taxonomic comments.** This species is currently listed as a junior synonym of *Oxyopes gracilipes* (White, 1849) which is a widespread species, at least in New Zealand and probably also temperate eastern Australia (Vink and Sirvid 2000). The holotype of *Oxyopes mundulus* was re-examined and a neotype was designated for *Oxyopes gracilipes* from New Zealand by these authors. We do not follow their synonymy because the authors were not able to examine the interior part of the epigyne of *Oxyopes mundulus* where the main differences between *O. mundulus* and *Oxyopes gracilipes* have been recognized. *Oxyopes mundulus* can be separated from from *Oxyopes gracilipes* by having the spermathecae in anterior position (compare with Vink and Sirvid 1998, fig 8). Note that the Godeffroy Collection contains four species with a translucent quadrangular scapus and they can be clearly separated by the internal structure of the epigyne whilst they only show minor differences in the shape of the external genitalia. Vink and Sirvid (2000) recognised also that the Godeffroy *Oxyopes* types include a closely related group that encompasses *gracilipes, elegans* and *rubicundus* as well as an undescribed species (almost certainly *godeffroyi* described in this paper).

### *Oxyopes punctatus* L. Koch, 1878

Figs 13A–E, 14A–D, 15A–C, 19E, F, 21C

580. *Oxyopes punctatus* L. Koch, 1878, 1011-1013, Taf. 88 Fig. 7 + 7 a u. 8 + 8 a, Australien, Rockhampton, 4 Syntypen (Mus. GODEFFROY Nr. 16495) (37) (Rack 1961).

**Figure 12.** *Oxyopes mundulus* L. Koch, 1878, female syntype (ZMH- A0000015): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

**Material examined. Designated here: MALE LECTOTYPE** (ZMH-A0000017), from **Queensland**, Rockhampton, 23°22'S, 150°30'E, Godeffroy Collection; (ZMH-A0000016) 3 female paralectotypes, same data as lectotype.

**Diagnosis.** Males of *Oxyopes punctatus* are similar to those of *Oxyopes amoenus* in having a long retrobasal, hooked cymbial process but can be distinguished by the long triangular median tegular apophysis (Figs 13D, 19E). Females of *Oxyopes punctatus* can be separated from all other described species by the rectangular scapus with long backwards directed projections at the posterolateral corners (Figs 14C, D, 15A–C).

**Description.** *Male* (Lectotype, ZMH-A0000017). Total length 3.78. Prosoma 1.93 long, 1.47 wide, pl/pw 1.31; sternum 0.75 long, 0.98 wide, sl/sw 1.16; opisthosoma 1.85 long, 1.02 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.07; ALE 0.14; PLE 0.12; PME 0.12; ALE–ALE 0.17; ALE–AME 0.05; AME–AME 0.11; ALE–PLE 0.12; PLE–PME 0.16; PME–PME 0.20. Clypeus 0.37 high with a pair of thin dark dots. Prosoma pale, broadly oval, posteriorly straight, fovea short 0.16 of prosoma length. Chelicerae paturon pale with median dot and lateral condyle. Endites, labium and sternum pale; opisthosoma pear-shaped, pale with dark brown spots; venter pale with a triangular dark brown band medially. Legs pale scattered with dark brown markings. Male palp (Figs 13 C–E, 19 E, F): cymbium pear-shaped, retrolateral part straight with long retrobasal, hooked process, covered with pale setae and 2 prolateral spines in distal third; median tegular apophysis (mta) long triangular reaching embolus, conductor membranous, elongate, with hook-

**Figure 13.** *Oxyopes punctatus* L. Koch, 1878, male lectotype (ZMH- A0000017): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C,** male palp, prolateral view; D, same, ventral view; **E**, same, retrolateral view;. Scale bars: habitus 1.0 mm, palp 0.1 mm.

like distal part, originating retro-basally; sperm duct u-shaped; embolus semicircular, distal tegular apopysis down-curved with sharp retro-distal tip fitting in apex of conductor supporting embolus; tibia with rectangular, ventral tibial apophysis.

Female (Paralectotype, ZMH-A0000016). Total length 5.89. Prosoma 2.30 long, 1.59 wide, pl/pw 1.44; sternum 0.96 long, 0.9 wide, sl/sw 1.07; opisthosoma 3.59 long, 2.53 wide. Colour as in male. Opisthosoma pear-shaped; Eyes: AME 0.1.0; ALE 0.16; PLE 0.13; PME 0.13; ALE–ALE 0.17; ALE–AME 0.06; AME–AME 0.12; ALE–PLE 0.15; PLE–PME 0.22; PME–PME 0.23. Clypeus 0.58 high. Female epigyne (Figs 14C, D, 15A, 21C): scapus translucent, rectangular with long backwards directed projections at the posterolateral corners, lateral lobes straight reaching middle of scapus; copulatory openings in the middle of lateral lobes, copulatory ducts, short, convoluted with one thick coil, ending in globular lateral spermathecae, situated at basal part of scapus.

**Figure 14.** *Oxyopes punctatus* L. Koch, 1878, female syntype (ZMH- A0000016): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view, cleared; **D**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

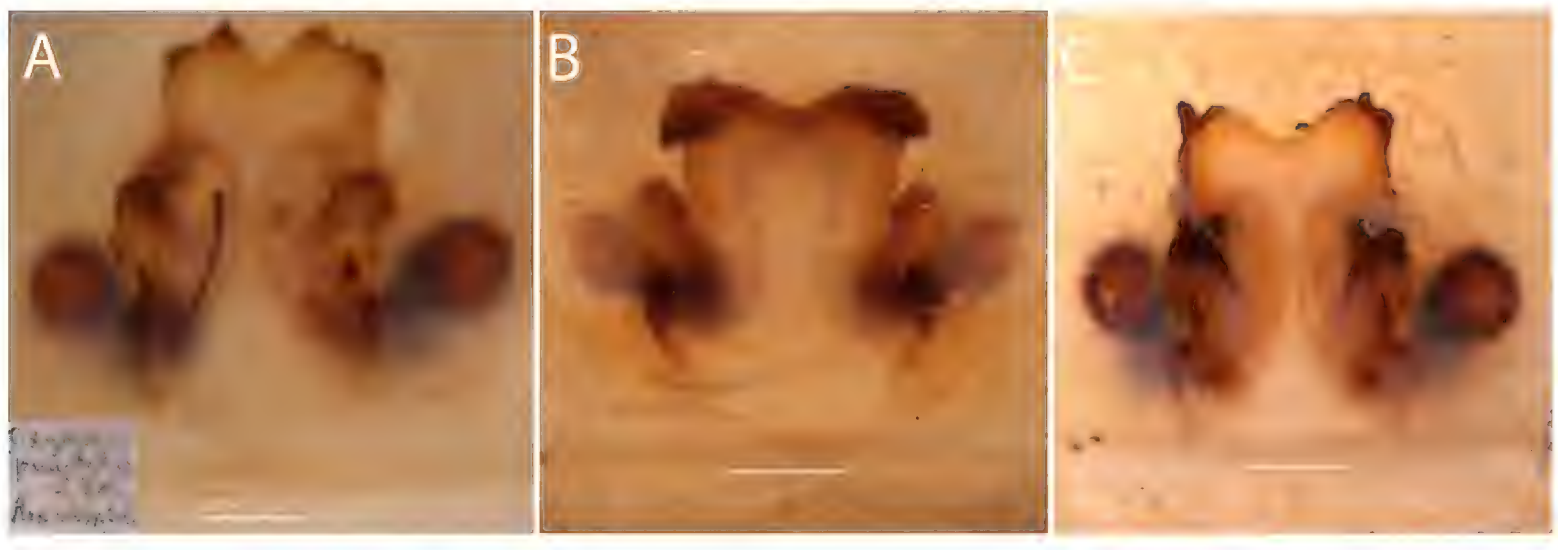


**Figure 15.** *Oxyopes punctatus* L. Koch, 1878, epigynes of female paralectotypes (ZMH- A0000016): **A**, female paralectotype described; **B**, second female; **C**, third female. Scale bars: epigyne 0.1 mm.

**Distribution.** Original record from Rockhampton in central Queensland. The ALA lists more additional records from coastal Queensland, from near Kununurra in north-western Australia and Perth in the southwest that need to be checked in a revisionary framework.

### *Oxyopes quadrifasciatus* L. Koch, 1878

Figs 16A–E, 21D

581. *Oxyopes quadrifasciatus* L. Koch, 1878, 1020-1021, Taf. 89 Fig. 6 + 6 a, Australien, Peak Downs, Holotype (Mus. GODEFFROY Nr. 16499) (37) (Rack 1961).

**Material examined.** FEMALE HOLOTYPE (ZMH-A0000018), from **Queensland**, Peak Downs, "now large open cut coking coal mine in Queensland located 31 km SSE of Moranbah", 22°15'9.60"S, 148°10'30.00"E, Godeffroy Collection.

**Diagnosis.** The female of *Oxyopes quadrifasciatus* can be separated from females of all other described Australian *Oxyopes* species by the inverted anchor-shaped scapus with triangular tip and short outward directed lateral lobes (Figs 16 C–E, 21 D). Male unknown.

**Description.** *Female* (Holotype, ZMH-A0000018). Total length 6.11. Prosoma 2.44 long, 1.87 wide, pl/pw 1.30; sternum 1.01 long, 0.93 wide, sl/sw 1.09; opisthosoma 3.67 long, 1.62 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.11; ALE 0.21; PLE 0.20; PME 0.20; ALE–ALE 0.24; ALE–AME 0.0.06; AME–AME 0.15; ALE–PLE 0.19; PLE–PME 0.27; PME–PME 0.27. Clypeus 0.46 high with a pair of thin longitudinal brown stripes. Prosoma pale with brown lateral bands, rectangular, posteriorly straight, fovea short. Chelicerae paturon pale with longitudinal median dark stripe and lateral condyle. Endites, labium and

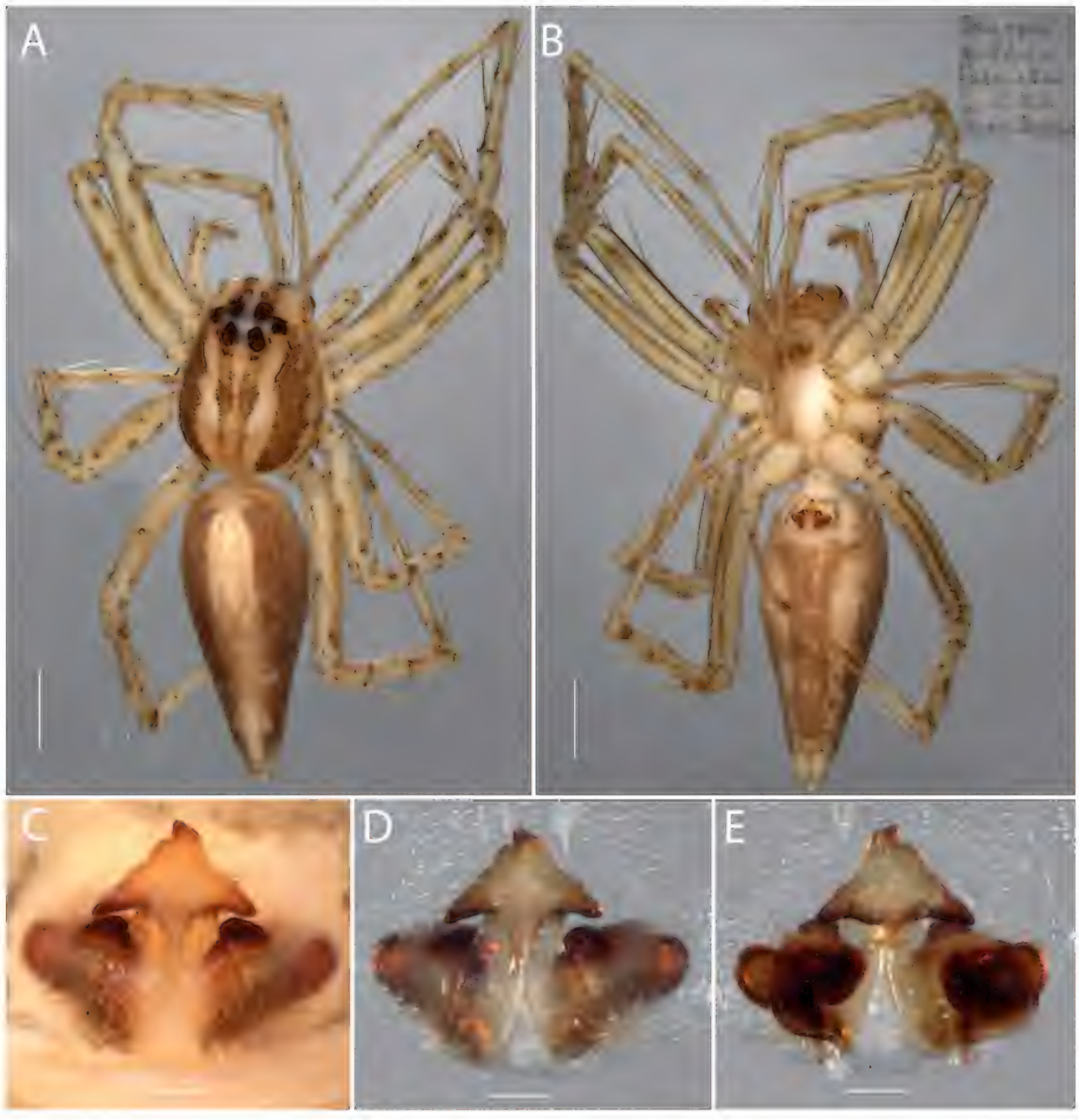


**Figure 16.** *Oxyopes quadrifasciatus* L. Koch, 1878, female holotype (ZMH- A0000018): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

sternum pale; opisthosoma pale with two longitudinal dark brown bands; venter pale with two longitudinal dark brown stripes laterally. Legs pale with dark brown stripes ventrally. Female epigyne (Figs 16 C–E, 21 D): scapus inverted anchor-shaped with triangular tip and short outwards directed lateral lobes, broad copulatory ducts, convoluted with one thick coil, ending in egg-shaped lateral spermathecae situated at middle part of scapus.

**Distribution.** Original records from Peak Downs in central Queensland. The ALA lists additional records from the Brisbane area, coastal Queensland, the Pilbara in Western Australia and near Melbourne that need to be checked.

### *Oxyopes rubicundus* L. Koch, 1878

Figs 17A–E, 21E

582. *Oxyopes rubicundus* S L. Koch, 1878, 1013-1015, Taf. 89 Fig. 1 + 1 a u. 2-2 b, Australien, Sydney, 2 Syntypen (Mus. GODEFFROY Nr. 16496) (37) (Rack 1961).

**Material examined. Designated here: FEMALE LECTOTYPE** (ZMH-A0000019), from **New South Wales**, Sydney, 33°51'S, 151°12'E, Godeffroy Collection; (ZMH-A0000027) 1 female paralectotype same data as lectotype, Godeffroy Collection.

**Diagnosis.** Females of *Oxyopes rubicundus* can be separated from females of all other described Australian *Oxyopes* species by the translucent quadrangular scapus, the thin copulatory ducts, convoluted with four thin coils, ending in globular lateral spermathecae (Figs 17C–E, 21E). Male unknown.

**Description.** *Female* (Lectotype, ZMH-A0000019). Total length 6.99. Prosoma 2.66 long, 1.99 wide, pl/pw 1.34; sternum 1.13 long, 1.00 wide, sl/sw 1.19; opisthosoma 4.33 long, 2.90 wide. Eight eyes in four rows with six eyes forming a hexagon, AME 0.08; ALE 0.18; PLE 0.16; PME 0.20; ALE–ALE 0.22; ALE–AME 0.06; AME–AME 0.13; ALE–PLE 0.17; PLE–PME 0.26; PME–PME 0.29. Clypeus 0.56 high with a pair of longitudinal dark brown bands. Prosoma pale with brown sides and median triangle, rectangular, posteriorly straight, fovea short, 0.12 of prosoma length. Chelicerae paturon pale with longitudinal median dark band and lateral condyle. Endites and sternum pale, labium and lateral part of

**Figure 17.** *Oxyopes rubicundus* L. Koch, 1878, female lectotype (ZMH- A0000019): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

sternum dark brown; opisthosoma pale with brown sides and a lanceolate median stripe; venter pale with a triangular dark brown band medially. Legs pale. Female epigyne (Figs 17C–E, 21E): with translucent quadrangular scapus, lateral lobes hidden behind scapus; copulatory ducts, thin, convoluted with four thin coils, ending in globular lateral spermathecae situated at mid-level of scapus (Figs 17E, 21E).

**Distribution.** Original records from Sydney in New South Wales. The ALA lists additional records from Sydney, South Australia and southwestern Australia that need to be checked in a revisionary framework.

**Remarks.** Koch cites Dämel that live specimens are greyish-brown and 'like coated with powder'. Carapace and abdomen with a broad coffee-brown line which is framed light brown. Specimens from Sydney were found on leaves, but the species was also netted from low plants in swampy areas.

### *Oxyopes variabilis* L. Koch, 1878

Figs 18A–E, 21F

584. *Oxyopes variabilis* L. Koch, 1878, 1021-1024, Taf. 90 Fig. 1 + 1 a u. 2-2 b, Australien, Gayndah, 2 Syntypen (Mus. GODEFFROY Nr. 16500) (37) (Rack 1961).

**Material examined. Designated here: FEMALE LECTOTYPE** (ZMH-A0000021), from **Queensland**, Gayndah, 25°37'S, 151°36'E, Godeffroy Collection; (ZMH-A0000020) 1 female paralectotype, same data as lectotype, Godeffroy Collection.

**Diagnosis.** Females of *Oxyopes variabilis* are similar to females of *Oxyopes amoenus* but can be distinguished by the epigyne with longer lateral lobes in inverted v-shaped position and the copulatory ducts with 7 thin coils (Figs 18C–E, 21F). Male unknown.

**Figure 18.** *Oxyopes variabilis* L. Koch, 1878, female lectotype (ZMH- A0000021): **A**, habitus, dorsal view; **B**, habitus, ventral view; **C**, epigyne, ventral view; **D,** epigyne, ventral view, cleared; **E**, epigyne, dorsal view, cleared. Scale bars: habitus 1.0 mm, epigyne 0.1 mm.

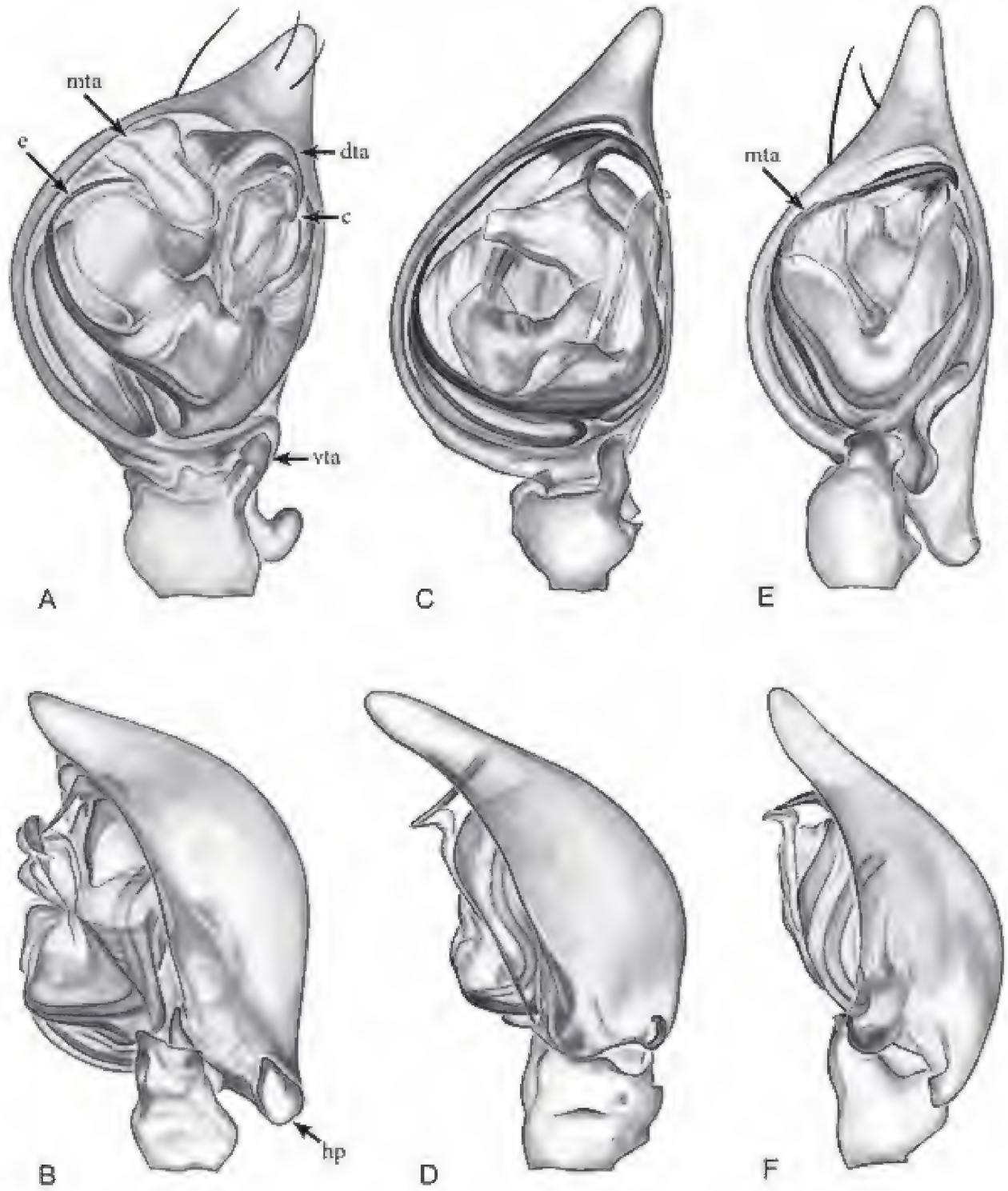


**Figure 19.** *Oxyopes amoenus* L. Koch, 1878 (ZMH- A0000029); **A**, male palp, ventral view; **B**, palp, retrolateral view. *Oxyopes gracilipes* (White, 1849) (ZMH- A0000007); **C**, palp, ventral view; **D,** palp, retrolateral view. *Oxyopes punctatus* L. Koch, 1878 (ZMH- A0000017); **E**, palp, ventral view; **F**, palp, retrolateral view.

**Description.** *Female* (Lectotype, ZMH-A0000021). Total length 5.63. Prosoma 2.45 long, 1.88 wide, pl/pw 1.30; sternum 1.39 long, 1.26 wide, sl/sw 1.10; opisthosoma 3.18 long, 2.00 wide. Eight eyes in four rows with six eyes forming a hexagon, AME smallest ALE biggest, others equal in size; AME 0.08; ALE 0.19; PLE 0.18; PME 0.18; ALE–ALE 0.25; ALE–AME 0.06; AME–AME 0.13; ALE–PLE 0.18; PLE–PME 0.26; PME–PME 0.27. Clypeus 0.53 high mottled with dark brown. Prosoma yellow brown mottled with dark brown and covered with grey feathery setae, oval, posteriorly rounded, fovea short, 0.14 of prosoma length. Chelicerae paturon yellow brown mottled with dark brown and lateral condyle. Endites, labium and sternum yellow brown, mottled with dark brown; opisthosoma elongated, pale with dark brown lateral and medial stripes; venter, sides dark brown with a long, triangular, pale brown median stripe. Legs yellow brown mottled with dark brown. Female epigyne (Figs 18C–E, 21F): scapus broadly T-shaped and long lateral lobes in inverted v-shaped position, reaching 3/4 of scapus; copulatory openings basally of lateral lobes, copulatory ducts, thin, convoluted with 7 thin coils, ending in globular, spermathecae situated laterally of the T-shaped arms (Fig. 18E).

**Distribution.** Original record from Gayndah in northern Queensland. The ALA lists many additional records from Queensland, Western Australia, South Australia and New South Wales.

**Remarks.** Koch cites Dämel's records that live specimens have a dark brown carapace and legs. The abdomen is ash-grey and 'like coated with powder'. Specimens were collected from low shrubs and plants.

## Discussion

### Towards a taxonomy of Lynx Spiders in Australia

There is currently no taxonomic revision for the Lynx Spiders of Australia and the described diversity is probably just a small fraction of the actual species diversity that occurs on this continent (Framenau et al. 2014). Almost all oxyopid species in Australia were described from material collected by either Eduard Dämel or Amalie Dietrich in near-coastal Queensland. The map

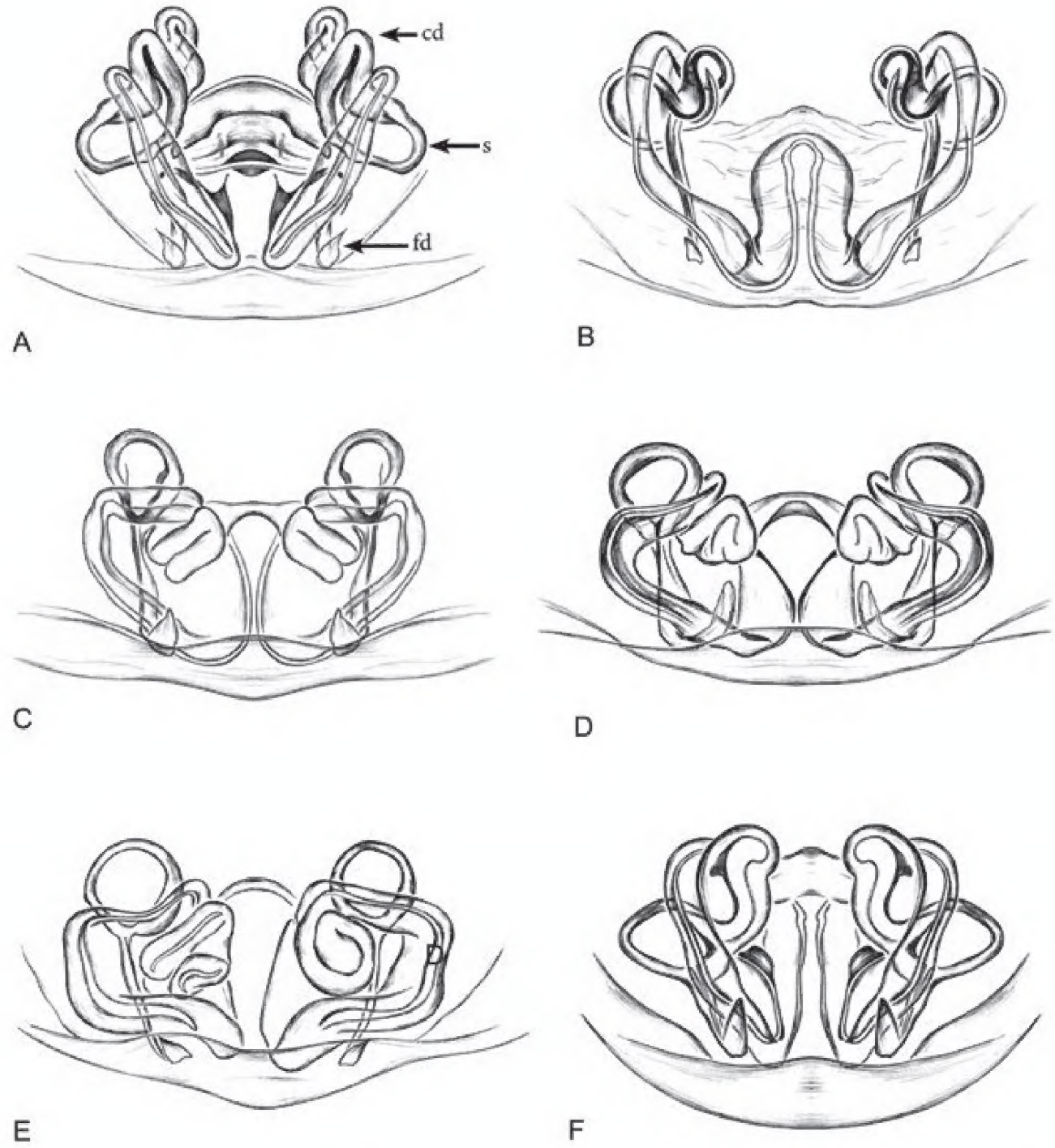


**Figure 20.** Internal female genitalia, dorsal view. **A,** *Oxyopes amoenus* L. Koch, 1878 (ZMH- A0000003); **B**, *Oxyopes attenuatus* L. Koch, 1878 (ZMH- A0000005); **C**, *Oxyopes elegans* L. Koch, 1878 (ZMH- A0000006); **D**, *Oxyopes godeffroyi* sp. nov (ZMH- A0000008); **E**, *Oxyopes mundulus* L. Koch, 1878 (ZMH- A0000015); **F**, *Oxyopes gratus* L. Koch, 1878 (ZMH- A0000009).

(Fig. 22) shows these localities and the general distribution of the genus *Oxyopes* (ALA 2017) in Queensland. The faunas of other areas of Australia known for high diversity and endemism, such as southwestern Australia and the table mountains of New South Wales, have never been studied and almost nothing is known about this oxyopid fauna. Although according to the Atlas of Living Australia (2017), all species are considered to be widespread, very often across the entire continent and multiple biomes, they were originally described from just one or only few localities. Undoubtedly, the estimation of range sizes and species diversity is caused by poor taxonomic resolution in a group where the identification had to rely on the historical descriptions by L. Koch. These are of high quality despite their age but do not illustrate fine details of genitalia that are used to reliably identify spider species today and may lead to misidentifications.

Although the historical descriptions by Koch suggest that many oxyopid species are not narrow range endemics (the same species were described by Koch from localities in both Queensland and New South Wales and we agree with his interpretation), it is considered unlikely that almost all recognized species have ranges that encompass the entire continent and diverse habitats from tropical rainforests to arid deserts. The original collection records Dämel denote habitat preferences (e.g. swampy areas) for at least some species that may restrict ranges and, again, the estimates may reflect the poor taxonomic foundation and the misidentification of morphologically similar species (e.g. those with similar colour patterns).

The current study which properly illustrates the important morphological characters but also fixes type localities and type specimens is an essential prerequisite towards a comprehensive taxonomic treatment of this fauna at both, the species level and genus level. It should now be possible to identify new species by comparison with the descriptions we have produced here for the old specimens, assess species boundaries based on morphology, and generic concepts that are clearly imprecise at the moment (but see Grimshaw 1989).

## Reworking the Godeffroy Collection of arachnids

The Godeffroy Collection of Australian arachnids is an impressive repository of Australian biodiversity from a

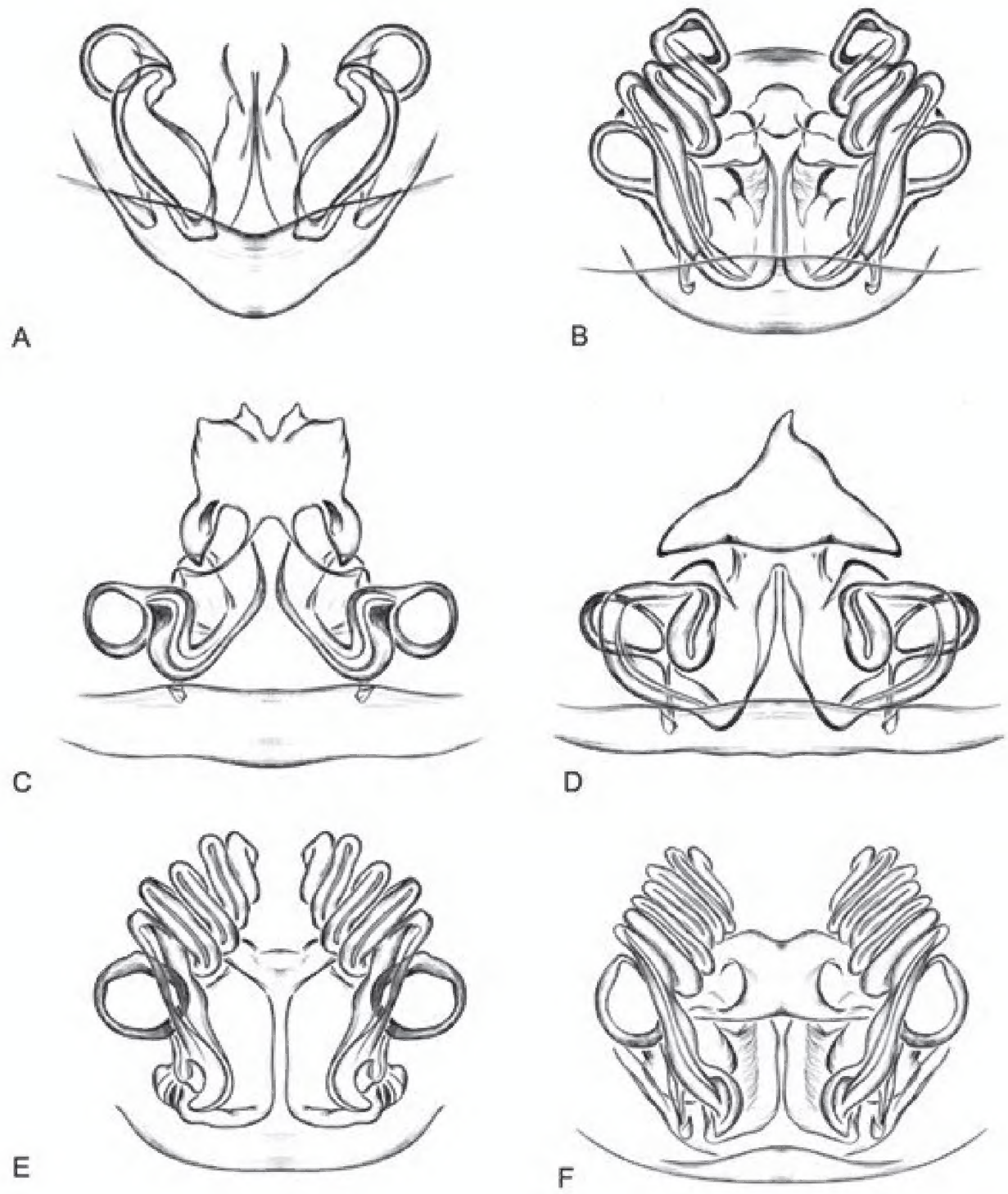


**Figure 21.** Internal female genitalia, dorsal view. **A**, *Oxyopes macilentus* L. Koch, 1878 (ZMH- A0000012); **B**, *Oxyopes molarius* L. Koch, 1878 (ZMH- A0000013); **C**, *Oxyopes punctatus* L. Koch, 1878 (ZMH- A0000016); **D**, *Oxyopes quadrifasciatus* L. Koch, 1878 (ZMH- A0000018); **E**, *Oxyopes rubicundus* L. Koch, 1878 (ZMH- A0000019); **F**, *Oxyopes variabilis* L. Koch, 1878 (ZMH- A0000021).

time when not much was known about the fauna of this continent. It is a snapshot of a time when Australia was frontier country and the now urban areas of Brisbane and Rockhampton were densely vegetated (e.g. Bradshaw 2012). As such, the importance of this collection also lies in providing baseline data for the assessment of spider diversity in these areas today. Much of the original habitat has been modified extensively since the time of Eduard Dämel and Amalie Dietrich and the original bush habitat has been lost in many areas. The importance of historical collections has recently been demonstrated in Western Australia where some millipede species were collected in 1905 by Wilhelm Michaelsen (a zoologist from Hamburg) in the Perth area. These millipedes have not been recorded since (Car et al. 2013), perhaps because the original locality data are wrong but potentially also because these extreme narrow-range endemics may be now extinct. Similar histories are known for some of the Queensland fauna (e.g., Raven and Wishart 2006: *Arbanitis longipes*; Raven and Stumkat 2003: genus *Uliodon*; Raven 1982: *Ixamatus varius*) and future field work in these areas should target these species, not only to reconstruct the original travel routes of the early explorers that are not entirely clear, but also to compare arachnid diversity across time. A potential obstacle in this process is that collection data for the old specimens are often imprecise (e.g., "Brisbane"), so the re-collection of specimens could in turn also help to reconstruct the routes of early explorers. This may be particularly interesting in the case of Amalie Dietrich because her exact travel route is still being debated. Clearly, the story of this collection is also cultural and historical, highlighting the pioneer spirit of early zoologists in providing a first inventory of a then-unknown fauna and the economic but also cultural promoters of their activities.

## Taxonomic remarks and re-working Koch

Generic concepts in oxyopids are in flux and the current classification of the Australian fauna can only be achieved through a detailed analysis (Grimshaw 1989). On a smaller scale, it is interesting that our study also

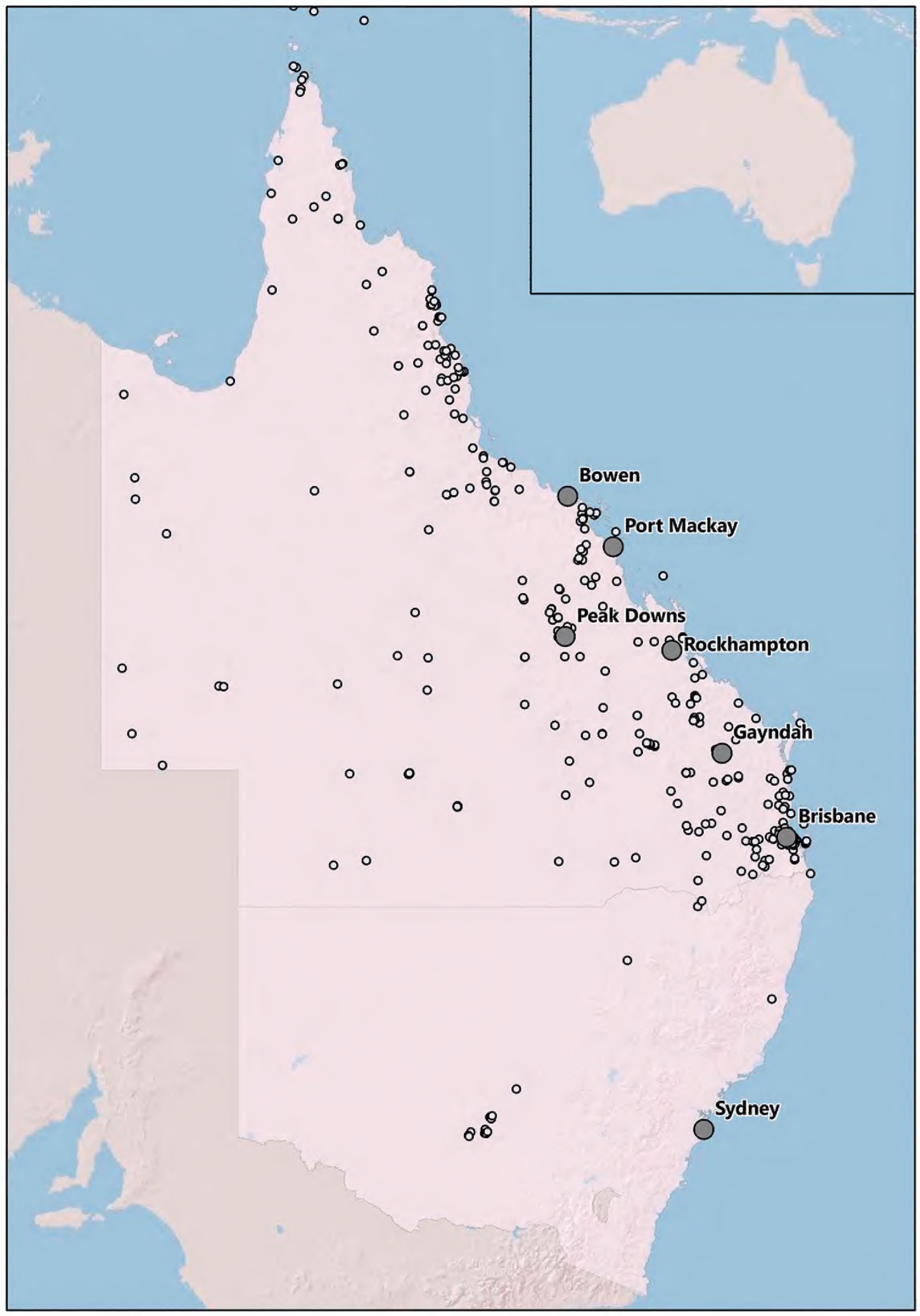


**Figure 22.** Distribution map of the genus *Oxyopes* in Queensland. Large grey dots are the localities of the here re-described *Oxyopes* species (photo: Michael Curran).

highlights that Koch's original species hypothesis are not set in stone and the collections by him can lead to surprises. Koch (1878) described *Oxyopes elegans* from 3 different localities: from Sydney, 3 females, from Rockhampton, 2 females, and from Peak Downs, 1 male. The male from Peak Downs is conspecific with *Oxyopes gracilipes*, a species originally described some decades earlier from New Zealand (White 1849) and the females from the two different localities belong to two different species. The female from Sydney is designated here as the lectotype of *Oxypes elegans*, but the females from Rockhampton belong to a new species, *Oxyopes godeffroyi*. Koch (1878, p. 1011) clearly considered all specimens to belong to a single species, which is potentially caused by similarities in colour that he emphasized in his descriptions.

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